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Journal of Occupational Medicine

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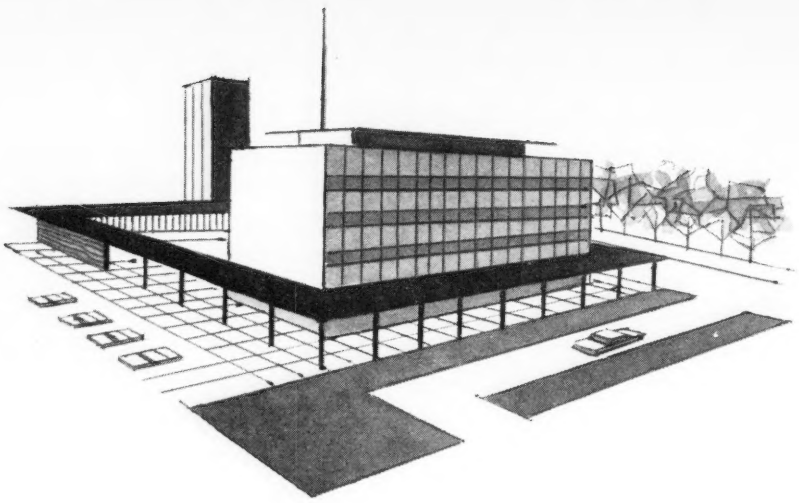
OFFICIAL PUBLICATION OF THE INDUSTRIAL MEDICAL ASSOCIATION



work capacity with no breakfast and a mid-morning break

The experiment* reported here had as its object to show effect of various regimens of breakfast and mid-morning breaks on maximum work output as measured by a bicycle ergometer. Twenty subjects, 18 to 36 years of age, including both office and factory workers participated. The various periods of the experiments used for the comparisons were as follows:

Period 1. Basic breakfast without mid-morning break.
Period 2. No breakfast without mid-morning break.
Period 3. Basic breakfast with mid-morning break.
Period 4. No breakfast with mid-morning break.

"The data seem to justify the following conclusions:

"All subjects did significantly more work when the dietary regimen included an adequate breakfast than when it was omitted.

"The addition of a mid-morning break when an adequate breakfast was eaten resulted in no advantage as far as maximum work output was concerned.

"The addition of a mid-morning break to a dietary regimen which omitted breakfast showed a significant advantage for half of the subjects, in maximum work output.

"The data seem to indicate that an adequate breakfast is better economy as far as capacity to work is concerned than the substitution of a mid-morning break for breakfast."

**Tuttle, W. W., Herbert, Edward: Work Capacity With No Breakfast and a Mid-Morning Break. J. Am. Dietet. A. 137:37, 1960.*

a basic breakfast† used in this experiment followed this moderate low-fat, well-balanced menu.

FRUIT **CEREAL** **MILK** **BREAD** **SPREAD**

†A Summary of the Iowa Breakfast Studies, published by Cereal Institute, Inc., May 1, 1957.

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135 South La Salle Street, Chicago 3

A research and educational endeavor devoted to the betterment of national nutrition

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Official Publication of the Industrial Medical Association

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46th Annual Meeting

REPORT FROM THE EDITOR

The forty-sixth Annual Meeting of the Industrial Medical Association was staged at the Biltmore Hotel, Los Angeles, Calif., on April 11-13, 1961. Applying the customary yardsticks of meeting success, this occasion prospered in intellectual content of program, attendance at functions, business accomplished, and pleasantries.

GRADIE R. ROWNTREE, M.D., became the new President of the Industrial Medical Association at this meeting. He is Medical Director, Fawcett-Dearing Printing Co., Louisville, Ky. DR. ROWNTREE is a specialist in public health and in occupational medicine, a prime mover in the cause of industrial medicine in Kentucky, and has long been active on the national scene in the business of the Industrial Medical Association, American Public Health Association, and Americal Medical Association.

Elected to other offices and the Board of Directors were: President-elect—H. GLENN GARDINER, M.D.; First Vice-President—JOHN L. NORRIS, M.D.; Second Vice-President—EDWARD J. SCHOWALTER, M.D.: Secretary—EMMETT B. LAMB, M.D.; Treasurer—JERMYN F. MCCAHAN, M.D.; Directors, 1961-1964—PRESTON N. BARTON, M.D.; JOHN F. SHRONTS, M.D.; GORDON A. SINCLAIR, M.D.; RICHARD A. SUTTER, M.D.; and ROBERT A. WISE, M.D.

Business Meeting

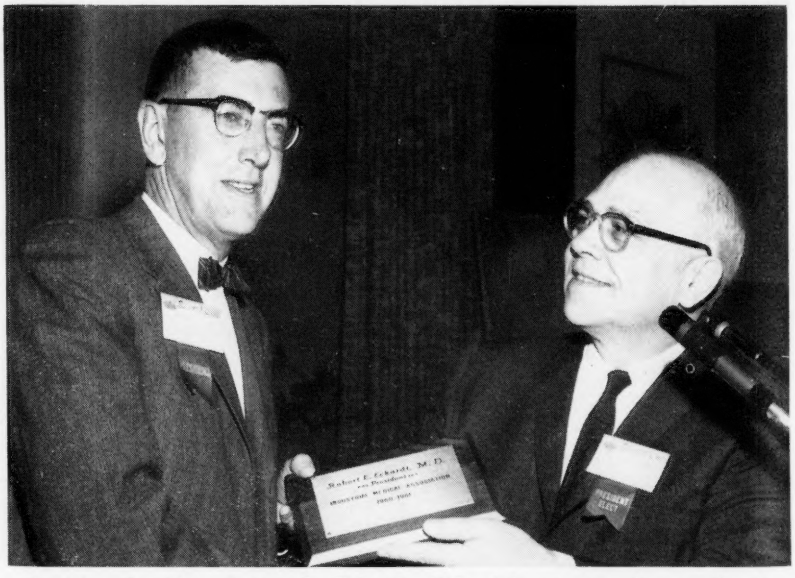
Changes in the Association's By-Laws as recommended by the By-Laws Committee and published in the March, 1961, issue of this Journal were voted upon and approved unanimously at the IMA Annual Business Meeting.

Second West Coast Meeting

The Industrial Medical Association operated for almost 40 years as a service organization to physicians and surgeons serving industry in an area corresponding roughly to the northeast quarter of the United States. World War II brought about major shifts in population and in distribution of the country's industrial activities. One reflection of these changes was an impressive growth of industrial medicine in California, resulting in two meetings of IMA at Los Angeles within a decade, in 1953 and again in 1961.

American Industrial Health Conference

The IMA meeting was one of three that now constitute the American Industrial Health Conference. General Chairman of this Conference was GRADIE R. ROWNTREE, M.D., who was IMA President-Elect until assuming the presidency at the conclusion of the Annual Business Meeting. Deputy General Chairman of the Conference was EDWARD Z. ZAIK, M.D., Medical Director, Los Angeles District, Pacific Telephone and Telegraph Company. Chairman of the IMA meeting within the Conference structure was CLARENCE LEE LLOYD, M.D., Corporate Medical Director, North American Aviation, Inc., Los Angeles. Working closely with him in the general operations of the Annual Meeting was BIRCHARD M. BRUNDAGE, M.D., Medical Director, Atomics International, Canoga Park, Calif., who was chairman of the Arrangements Committee. Chairman of the American Association of Industrial Nurses meeting was MARY MULVIHILL, R.N., of Mobil Oil Company, Los Angeles. The American Association of Industrial



Retiring President Robert E. Eckardt, M.D., left, accepts the president's service plaque from incoming President, Gradie R. Rowntree, M.D. Immediately afterwards, Dr. Rowntree, acting on behalf of the Governor of his state, conveyed to Dr. Eckardt the commission of Kentucky Colonel. In return for the honor of being addressed as Colonel, the recipient agreed to help defend Kentucky against its enemies who, at least on the occasion of the presentation, seemed not to be clearly identified.

Physicians shown above were awarded Fellowship certificates at the 46th annual meeting.

Dentists presented no program at this Conference.

The IMA Meeting

The IMA program this year was the production of JEAN S. FELTON, M.D., Professor of Occupational Health, School of Public Health and School of Medicine, University of California, Los Angeles, whose university department is increasingly identified with the growing stature of occupational medicine as a specialty. Besides carrying the major load for developing the program, DR. FELTON presented papers and discussions of his own, presided over a working conference on graduate education in occupational medicine, and participated in the Association's business affairs as an IMA Director. He was assisted in the development of the surgery component of the program by PACKARD THURBER, JR., M.D., consultant in industrial surgery, Los Angeles, and in the session on Toxicology and Industrial Hygiene by MAJOR ROBERT T. P. DE TREVILLE, USAF, MC, Norton Air Force Base, Calif.

A New Program Format

Three innovations in the make-up of an IMA program met with singular success.

Intensive refresher courses were offered in four general subjects: Cardiology in Industry, Treatment of Radiation Injury, Dermatology in Industry, and Hearing Conservation in Industry. Essentially these were two-hour teaching sessions which reviewed the practical aspects of each area, presented by recognized specialists and teachers. Respectively, these were: RICHARD M. CALL, M.D. (Cardiology); GOULD A. ANDREWS, JR., M.D., HARRY FOREMAN, M.D., W. D. NORWOOD, M.D., and GEORGE L. VOELZ, M.D. (Radiation); RAYMOND R. SUSKIND, M.D. (Dermatology); and ARAM GLORIG, JR., M.D. (Hearing). Each course was offered twice, in successive two-hour periods. Attendance was permitted on the basis of prior registration, a provision which turned out to be a good one for the reason that the size of "classrooms" was inadequate for the number of persons who ultimately wished to gain entrance. In the same vein was a special clinic in trauma on "Problems of the Back." HOMER C. PHEASANT, M.D., Chairman of the Medical Staff, Orthopaedic Hospital, Los Angeles, was lecturer and discussion leader.

For the first time, the IMA program included a session on toxicology and industrial hygiene. Our members with interests of this kind heretofore have attended sessions of the American Industrial Hygiene Association's annual meeting, which this year was not a part of the Industrial Health Conference. Presentations of this kind are useful in proportion to data and specific facts which can be presented, general discussion having less value here than in the usual medical paper. Because of this characteristic it was possible to crowd no less than 22 papers into a single day. Most of these will appear in this Journal during the next year. As became the time and place of presentation, they gave emphasis to the new industry of the new industrial west: aviation, missilry, atomic energy, and chemicals.

A motion picture program was the feature of Tuesday evening of the meeting week. Three films were shown: (1) For Those Who Drink. The film was produced in collaboration with R. GORDON BELL, M.D., Willowdale, Ontario, for many years chairman of the IMA's Committee on Problem Drinking. (2) External Cardiac Massage. This demonstrates the procedure developed at The Johns Hopkins University for resuscitating patients with cardiac arrest or ventricular fibrillation. (See: Emergency Life-saving, an editorial in the January, 1961, issue of this Journal, page 39.) (3) The Disability Decision. This film, produced by the Bureau of Old Age and Survivors Insurance in cooperation with the American Medical Association points out the medical observations needed in medical reports upon which disability decisions subsequently are based.

The foregoing are classified as innovations of an IMA program. The standard components were also available: general sessions, and concurrent sessions in medicine and in surgery. The last of the surgery sessions, on the topic "Treatment of Patient with Multiple Injuries" was put on by top echelon faculty members of the University of Southern California School of Medicine, Los Angeles, with a discussion by ROBERT C. COMBS, M.D., of San Francisco, who is a member of this Journal's editorial board. With two other concurrent meetings competing for audiences, the first-class surgery panel was conducted before a distressingly small audience. Or perhaps it seemed to be small in the inordinately large

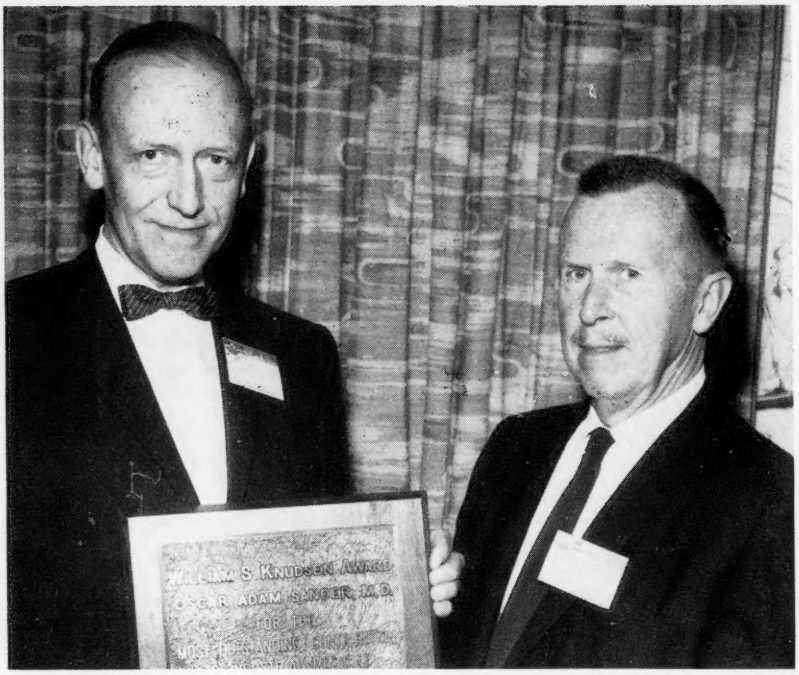
room provided for the particular session. There is a lesson here, perhaps, for future program planners.

Fellowship Certificates Awarded

The designation Fellow of the Industrial Medical Association was conferred upon 58 physicians in a little ceremony that over the years seems to have acquired dignity and impressiveness. The setting was the attractive Biltmore Bowl, and the timing, as usual, the first event of the Annual Business Meeting. The new fellows were ushered in by JEROME W. SHILLING, M.D., retired Medical Director, Los Angeles District, Pacific Bell Telephone Company, and a past president of IMA. DR. SHILLING presented the class of Fellows to ROBERT E. ECKARDT, M.D., the Association's President, who handed the certificates to the new Fellows. The new class is shown in the accompanying photograph. Present for the photograph and ceremony were: DRS. H. K. ABRAMS, W. L. ADAMS, C. H. BAYLOR, J. H. BEATTY, C. J. BENNETT, SIDNEY BRODY, M. F. BRUTON, R. T. P. DeTREVILLE, J. N. DEWANE, RICHARD DILLON, C. T. DISNEY, C. P. DOANE, T. J. DOLAN, J. V. S. DONALDSON, W. A. FELLNER, C. P. GIEL, B. W. GOODMAN, C. C. GREENE, JR., G. H. IRWIN, R. V. KRON, ERNEST MARCHAND, S. T. MILLER, IRVING OHR, F. L. PURCELL, R. C. ROSSBERG, BERNARD ROTHBARD, W. J. ROTHROCK, JR., P. J. ROZZERO, F. G. TALBOT, J. B. TAUBER, J. C. TROXEL, C. E. VAN MASON, HIRAM VAZQUEZ-MILAN and J. J. WELSH. Newly qualified Fellows who could not attend were DRS. S. H. BELGOROD, J. E. BLISS, L. A. CLOUD, J. M. DALEY, J. M. DeNARDI, O. W. FRISKE, S. T. GLASSER, J. L. GLEES, R. G. GREEN, R. J. HALEN, F. W. HOLCOMB, JR., H. J. JOHNSON, G. J. KIDERA, K. C. KOHLSAEDT, R. F. LAPHAM, A. A. McLEAN, W. J. McNAMARA, W. J. O'HARE, E. H. PLANCK, JR., H. E. REED, J. H. SCHIFF, B. H. SHEVICK, H. F. WENDELKEN, W. L. WILSON.

Occupational Medicine Awards

An occasion for hearty congratulations in several directions at once is provided annually when IMA bestows its four famous Awards: The Knudsen Award, to the physician who has personally made a most outstanding contribution to industrial medicine; The Merit-in-Authorship Award, to the author of the best industrial medical publication of the year; the Health-in-Industry Award, to the industrial organization with an exceptionally good medical program; and the Meritorious Service Award, to the IMA member who most nearly ruined himself for the good of the order.



O. A. Sander, M.D., left, received the Knudsen Award plaque from James H. Sterner, M.D.

The Knudsen Award

The Knudsen Award, given each year by the IMA to a physician considered to have made an outstanding contribution to industrial medicine, this year was given to OSCAR A. SANDER, M.D., consultant in occupational medicine, Milwaukee, Wis. JAMES H. STERNER, M.D., Chairman this year of the Knudsen Award Committee and a former winner of the Award, made the following presentation address:

"The high honor and signal recognition of the Knudsen Award is bestowed on OSCAR ADAM SANDER for his important and substantial contribution to the understanding of occupational pulmonary disease. From an experience extensive in kind and in time, he has offered, with discernment and with clarity, guiding principles which have done much to bring order and reason to the evaluation of lung afflictions associated with occupation. Particularly, his notable observations on the deposition of iron oxide in the lungs of electric welders strikingly emphasized the disparity which may exist between x-ray findings and pulmonary function. In addition, his well-documented investigations on foundry workers have done much to resolve the controversy and to demonstrate effectively that workers with minimal nodular silicosis can safely continue in jobs where good air hygiene has been provided. Through his unstinting participation in professional society activities, often I am sure at considerable personal sacrifice, he has played a leading role in developing an orderly and logical organization of knowledge of industrial lung disease.

"DR. SANDER was graduated from the University of Pennsylvania Medical School in 1927 and had his

(Continued on page 10a)

"It's about time a strong analgesic without undue sedative action was available for ambulatory patients. Many of my cancer patients who are up and around could use an agent that doesn't make them drowsy, doesn't force them to bed too soon."

"The time is here—
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constipation. In contrast to most other analgesics, Alvodine is fully effective when administered orally. Injection may be given for quick action or when parenteral use is indicated.

Alvodine tablets, 50 mg., scored. Average oral dose for adults: from 25 to 50 mg. every four to six hours as required.

Alvodine ampuls, 1 cc. containing 20 mg. per cc. Average subcutaneous or intramuscular dose for adults: from 10 to 20 mg. every four hours as required. *Narcotic Blank Required.*

Winthrop LABORATORIES
New York 18, N. Y.

*Alvodine, trademark.

Association Activities

(Continued from page 6a)

internship and residency in Pittsburgh. Then followed a period of graduate study at the Saranac Laboratory, and the inspiration and stimulation for a lifetime career in chest diseases.

"His professional identification includes fellowship in the Industrial Medical Association, the American College of Physicians, the American College of Chest Physicians, and the American Academy of Occupational Medicine. He is Associate Clinical Professor of Medicine at Marquette University School of Medicine, and Visiting Lecturer in Preventive Medicine at the University of Wisconsin Medical School. Over the years he has served as a consultant to a number of major governmental agencies. He is a member of the Council on Occupational Health of the American Medical Association and has had many other important committee assignments for professional organizations. He is a member of the Board of Directors of the National Tuberculosis Association and was Vice-President in 1957-1958.

"DR. SANDER has been the author of numerous scientific articles and a contributor of chapters on occupational lung disease in at least seven monographs. He has served as Associate Editor of the *Archives of Environmental Health* and of *Industrial Medicine and Surgery.*

"And finally, in addition to his unquestioned scientific and professional distinction, 'Chic' has brought to his many organizational contacts a warm and contagious charm which has helped effectively in the resolution of difficult and controversial problems.

"Chic, I have no slightest qualm or reservation in welcoming you to the small band of Knudsen Award recipients. I am sure that you will prize this recognition with deep humility and guard it with the firm zeal which has helped to make it and keep it the highest award in Occupational Health."

In response to this, DR. SANDER spoke as follows:

"Mr. President, Officers, Directors, and Fellow Members of the Industrial Medical Association:

John D. Leary (center), Vice-President—Personnel for Chrysler Corporation accepted the Health Achievement in Industry Award from Richard A. Cutter, M.D. At left is Marion W. Jocz, M.D., Corporate Medical Director for Chrysler.

"Needless to say, I am most grateful to the Association for this high honor. In accepting this Award, I realize how very lucky I was to have had such great men as teachers in the early part of my specialized medical training. Starting with HENRY PANCOAST, EUGENE PENDERGRASS, LEROY GARDNER, ANTHONY LANZA, ROYD SAYERS, and many others—all were a great inspiration to me and I know were a real factor in my choosing this rather narrow specialty of occupational diseases of the lungs.

"And a most fascinating experience it has been these past 28 years of observation of workers in various dusty trades, but principally in the foundry industry. And the dramatic change which has occurred in the silicosis and tuberculosis incidence in this period is almost unbelievable. In our first statistical study of the foundry group, almost 20% of the workers in some foundries had silicosis and up to 3% of these had active tuberculosis as well.

"Today we see relatively few cases of progressive silicosis and silicotuberculosis and most of our foundries have not produced a new case of silicosis in more than 20 years. The statisticians of the U. S. Public Health Service tell us that the silicosis problem in the United States still is a serious one. That likely is true in some areas of the country and particularly in mines with high silica content, but their figures definitely do not apply to the foundries in our area.

"There are many reasons for this marked improvement in our silicosis picture, but two stand out especially: (1) the excellent cooperation of the foundry industry in bringing the silica dust hazard under control, and (2) the remarkable reduction of the tuberculosis death rate generally (from 35 per 100,000 in 1935 to 3 per 100,000 in 1960 in our state). Without these two collaborating factors, our silicosis problem undoubtedly still would be classified as serious today. I feel privileged to have been an observer of this truly remarkable reduction of both of these completely preventable diseases.

"Thank you again for this honor, and I assure you that I shall hang this plaque in my office with great pride."

Health in Industry Award

Chrysler Corporation was recipient of the 1961 Health Achievement in Industry Award. It was presented by RICHARD A. SUTTER, M.D., chairman of the Association's Health Achievement Committee. His presentation remarks follow:

"A highlight of this annual business meeting is the presentation

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specifically designed to help control cough

Just as a medical instrument is engineered for maximum efficiency in performing its specific function, BENYLIN® EXPECTORANT is formulated to provide effective relief of cough associated with colds or allergy.

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BENYLIN EXPECTORANT is a pleasant-tasting, raspberry-flavored syrup... completely acceptable to patients of all ages.

supplied: BENYLIN EXPECTORANT is available in 16-ounce and 1-gallon bottles.

Each fluidounce contains: 80 mg. Benadryl hydrochloride (diphenhydramine hydrochloride, Parke-Davis); 12 gr. ammonium chloride; 5 gr. sodium citrate; 2 gr. chloroform; 1/10 gr. menthol; and 5% alcohol. *Indications:* Relief of coughs due to colds, and other symptoms associated with colds, and coughs of allergic origin. *Dosage:* Adults—1 to 2 teaspoonfuls every three to four hours. Children—½ to 1 teaspoonful every four hours. *Precautions:* Products containing Benadryl should be used cautiously with hypnotics or other sedatives; if atropine-like effects are undesirable; or if the patient engages in activities requiring alertness or rapid, accurate response (such as driving).

PARKE-DAVIS

PARKE, DAVIS & COMPANY, Detroit 32, Michigan

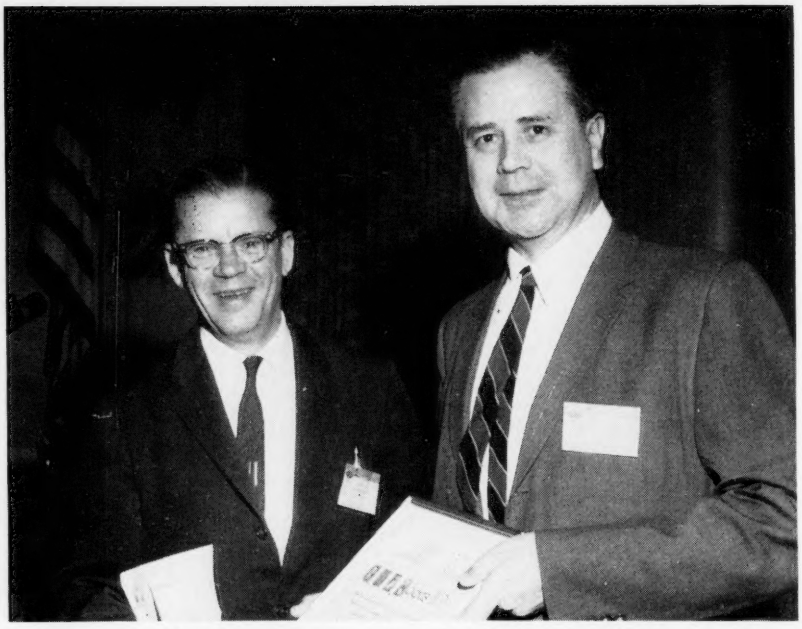
of the highest award given to management annually by our Industrial Medical Association. The company selected for this award is chosen from among many in American business by the Industrial Medical Association's Health Achievement in Industry Award Committee. Through this award, we pay tribute to a company for its development of an outstanding occupational health organization and for its contribution to this field of medicine.

"The award committee is composed of five members appointed by the president of the Industrial Medical Association. In order to secure the suggestion of as many candidates for the award as possible, the committee canvassed by personal letter the officers, directors, district counselors, and committee chairmen of the Industrial Medical Association, and the officers of the component societies. The entire membership was apprised of the purpose and activity of the committee through special notices placed in the JOURNAL OF OCCUPATIONAL MEDICINE. Members of the Industrial Medical Association were encouraged and urged to participate in the committee's activities.

"The committee was most impressed by the organizational philosophy and structure of the Chrysler Corporation medical department. All of the units are centralized under a corporate medical director, DR. MARION JOCZ, who is directly responsible to a top member of management. He reports to a Vice President of Personnel, who is also a director of the corporation and a member of the Administrative Committee, which is the top policy and decision-making group of the corporation. In organizational practice, physician reports to physician.

"Another important factor in Chrysler's medical program is the scope of its research activities covering plant and environmental hazards as well as studies of diseases and conditions which may help the community at large.

"It is worthy to note that the industrial hygiene section is an integral part of the medical department. The department has a well-planned in-service training program for nurses and physicians. Its medical library is outstanding and available to medical personnel across the country.



William F. Ashe, M.D., left, presenting the Merit in Authorship Award to G. W. H. Schepers, M.D.

"The Chrysler medical program demonstrates that a highly individualistic group of professional people can function well within the framework of established business practice.

"The Chrysler Corporation has demonstrated that an enlightened management can achieve the highest quality of occupational medical services through a dedicated medical department. And it can render to its employees all the required preventive, therapeutic and rehabilitative measures without stepping beyond the bounds of accepted and approved occupational health programs.

"It is an honor to give this award to Chrysler Corporation. It is my great pleasure to present this recognition on behalf of the Industrial Medical Association to an officer of Chrysler Corporation and its Vice President of Personnel, MR. JOHN D. LEARY."

In accepting the award, MR. LEARY said, in part:

"DR. SUTTER, members of the Award Committee, distinguished guests and members of the Industrial Medical Association.

"On behalf of Chrysler Corporation, I thank you for presenting us with the 'Health Achievement in Industry Award.' We are pleased and we are honored. Our president and board Chairman, L. L. COLBERT, has asked me to express his personal appreciation to the Industrial Medical Association for the recognition you have given to Chrysler Corporation and to our Medical Director, DR. MARION JOCZ, and his staff.

"DR. JOCZ initiated the company's program of staff diagnostic and consulting services in the 1940's. The current formulized corporate medical policy and the organization of the personnel within the medical department who administer this policy were developed in 1958 under the direction of DR. JOCZ.

"Because it is an integral part of our company, our medical department can call on talented and highly trained personnel in other areas of the company for assistance in carrying on its medical work. We have experts in optics, vibration, sound, instrumentation, and virtually every other area of modern physics and chemistry. Our medical department has called upon these experts many times to pre-

in severe pollen sensitivity... rapid relief and control of symptoms on short-term therapy with Decadron®

Short-term treatment with DECADRON brought "...immediate complete suppression of symptoms"[1] in 56 patients who had not responded fully to ragweed emulsion. "In no patients... were there any immediate or delayed signs of hypercorticism... no side reactions or untoward effects of any definition or type."[1] Therapeutic doses of steroids may help prevent recurrences of severe allergic states, without interfering with desensitization or other immunity procedures.[2]

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References: 1. Brown, E. A.: Antibiotic Med. & Clin. Ther. 6:412, 1959. 2. Feinberg, S. M.: Med. Sci. 6:(No. 3)181, 1959.

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Division of Merck & Co., INC., West Point, Pa.

DECADRON: Recommended dosage schedule in the treatment of ragweed, tree, or grass sensitivity reactions		
time	amount	administration
[illegible]	[illegible]	[illegible]
2nd day	two 0.75 mg. Tablets DECADRON	b.i.d.
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6th day	one 0.75 mg. Tablet DECADRON	per day
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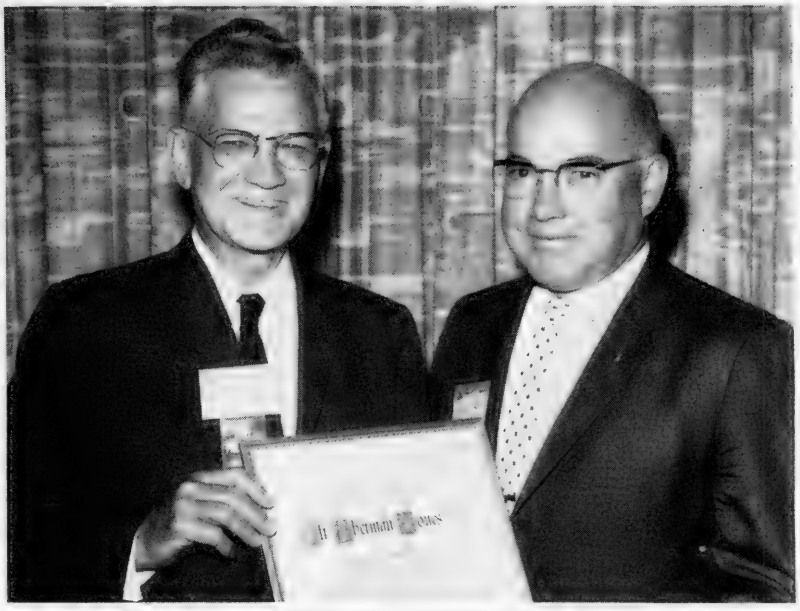
"We in management have supported the medical department's continuing efforts to improve its services in line with modern medical and management practices and techniques. It is particularly gratifying for you to tell us through this award that our support is justified and the efforts of DR. JOCZ and his staff have been successful. We consider a good industrial medical program a good investment for any company. It is humane. It contributes to smooth and efficient plant operations and output. It is economically justifiable.

"The greatest beneficiary, of course, of modern industrial medical practice is the employee. The employee of today enjoys on-the-job health protection as never before in industrial history. When an employee reports to work today, in most instances he enters an industrial plant in which his working conditions have been thoroughly inspected for his protection. The air he breathes, the machine he operates, the materials and fluids he touches, the sounds he hears, the lighting, and nearly everything else which surround him are measured, analyzed, studied, and evaluated in terms of his health. If necessary, his working environment is filtered, screened, or shielded to safeguard him against any potential threat to his health. This is in sharp contrast to what existed in industry generally in the early part of this century.



The Meritorious Service Award was presented to E. S. Jones, M.D., left, by James H. McDonough, M.D.

"Each of you in the Industrial Medical Association, supported by your individual managements, can justifiably take pride in having contributed to this growth and to the stature of occupational health medicine in this country."

Merit in Authorship

The IMA's Annual Merit in Authorship Award, for the most significant contribution to the current literature of industrial medicine, this year was given to G. W. H. SCHEPERS, M.D., D.Sc., for a series of three articles published in 1960 in *Industrial Medicine and Surgery* under the title, "Theories of the Causes of Silicosis." In making the presentation, WILLIAM F. ASHE, M.D., Chairman of the IMA's Merit in Authorship Award Committee, reviewed some significant details of Dr. Schepers' biography.

"DR. SCHEPERS, a native of the Union of South Africa, holds several degrees from the universities of that country: B.A., B.Sc., B.Sc. Hons., M.Sc., M.B.-B.Ch., M.D., D.Sc., M.D., and D.I.M. He achieved the rank of professor and department chairman at the University of Pretoria, Pretoria, S.A. in 1942, at the age of 28.

"DR. SCHEPERS' research and publications, at first ranging widely over anatomy, pathology, and clinical subjects, have for the past 10 years centered on the response of pulmonary tissue to various harmful agents. This enterprise has resulted in 90-odd publications in addition to two textbooks published alone and four textbooks written in association with others. His current research is in the broad field of biological adaptations to physical and chemical stresses, carried on at both the experimental and clinical level."

Meritorious Service Award

The Meritorious Service Award this year went to E. S. JONES, M.D., of Hammond, Ind. DR. JONES had just resigned as Chairman of the Board of Directors, Occupational Health Institute, after several years of outstanding service. In making the presentation of the Award in behalf of the Association, JAMES H. MCDONOUGH, M.D., recalled DR. JONES' unselfish labors in behalf of industrial medicine and organized medicine. He has been president of Lake County (Ind.) Medical Society, and for 16 years was chairman of the Industrial Medicine Commission of the Indiana State Medical Society. For many years he has served the A.M.A. as a member of its Council

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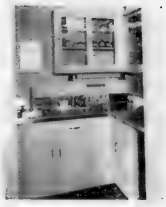

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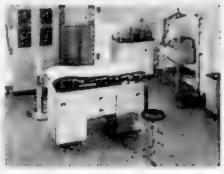

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on Occupational Health. He has served the IMA as a Director, Chairman of various committees, and as President. He is certified by the American Board of Preventive Medicine as a founder member in occupational medicine.

Sappington Memorial Lecture

The Sappington Memorial Lecture was delivered this year by RUTHERFORD T. JOHNSTONE, M.D., of Los Angeles. The lecture appears as the lead article in this issue of this Journal. Sponsored by the Occupational Health Institute, the Lecture might well be considered one of the awards bestowed at IMA's Annual Meeting. DR. JOHNSTONE was presented by E. S. JONES, M.D., Chairman, OHI Board of Directors. DR. JONES said:

"I am pleased to present as this year's Sappington Memorial Lecturer, DR. RUTHERFORD T. JOHNSTONE, consultant in occupational medicine in Los Angeles. After graduating from the University of Pittsburgh, Pittsburgh, Pa., in 1925 DR. JOHNSTONE practiced internal medicine in that city and taught at his medical school for 10 years. He then moved to California to take charge of the Department of Medicine of the Golden State Hospital, Los Angeles. This was a hospital that served numerous small industries, and DR. JOHNSTONE'S responsibilities in this organization led to an enduring interest in occupational disease diagnosis. Shortly after joining this staff, he established a Department of Occupational Disease, probably the first in any hospital in this country. He continued in this activity until he established his present practice in 1945.

"DR. JOHNSTONE'S first book, 'Occupational Diseases,' which appeared in 1942, was intended to help the general practitioner develop diagnostic competence in this special field. His second book was written with ALICE HAMILTON, and called 'Industrial Toxicology.' His third, 'Occupational Medicine and Industrial Toxicology,' had virtually world-wide reception as the American standard textbook on industrial medicine. It was translated and reprinted in the Spanish language. He is the senior author of 'Occupational Diseases and Industrial Medicine,' written with SEWARD E. MILLER, M.D., and just published.

"DR. JOHNSTONE and DR. SAPPINGTON were friends and associates in the development of a new field of medical practice. The Occupational Health Institute is proud to present DR. JOHNSTONE as this year's Sappington Memorial Lecturer."

This year's Sappington Memorial Lecture was delivered by Rutherford T. Johnstone, M.D., Los Angeles. The Lecture is sponsored by the Occupational Health Institute and is presented annually by invitation. Dr. Johnstone's address is the lead article in this issue.

Annual Banquet

There was a day when the IMA's annual banquet had to be a full evening's workout, or the customers wouldn't go. We started with prayin' and ended with preachin', and had an hour or two of formalities in between. Beginning about 10 years ago, the successive presidents have gradually trimmed the occasion down to something bearable by fat, middle-aged people. This year's president, ROBERT E. ECKARDT, M.D., carried the new look to its logical conclusion. Under the direction of RICHARD CALL, M.D., Los Angeles, chairman of the Banquet Committee, the affair became simply a dinner dance. Three hundred sixty-seven persons paid $10 each for a rip-roaring good time.

Scientific Exhibits

This year's scientific exhibits were assembled by HOMER S. ELMQUIST, M.D., Los Angeles, Calif. Thirteen exhibits, all good, elaborated on material of importance to the industrial practitioner. In accordance with the established custom, it was necessary for some one to decide that certain ones were better than the rest. The following were judged to be the award winners: First place—"The Inflamed Eye" by DAN GORDON, M.D., New York Hospital-Cornell Medical Center, New York, N.Y.; second place—"Closure of Skin Incisions Without Sutures" by THEODORE GOLDEN, M.D., ALBERT H. LEVY, M.D., and WILLIAM T. O'CONNOR, M.D., St. Vincent's Hospital, New York, N.Y., and Veterans Administration Hospital, East Orange, N.J.; third place—"Varicose Veins and Thrombophlebeitis" by ALBERT FIELDS, M.D., Los Angeles, Calif.

Technical Exhibits

The technical exhibits shared space with the scientific exhibits in the Rex Room of the Biltmore. This is just below the Biltmore Bowl, a principal meeting room for scientific sessions. Some 53 industrial concerns had booths this year. Most of them were old friends we see from year to year, and a few were newcomers. WILLIAM J. BURNS has done something to this part of the Industrial Health Conference. The show is attractive, and the mood is easy. We like to go.

Journal of Occupational Medicine

The Sappington Memorial Lecture

Occupational Medicine—The Captive Specialty

Rutherford T. Johnstone, M.D., Los Angeles, Calif.

IN HIS ascent of the Mountain of Purgatory, Dante reached a terrace encircling the hill. Sitting there, worn and tired, he turned to the East to remark—"all men are delighted to look back." Today, from my terrace of a quarter of a century in a practice limited to occupational medicine I rejoice in the opportunity to look back and then, with you gaze at the present.

For most of you gathered here today the sun is in the East from whence blow the winds of socioeconomic turbulence. For only a few of us the sun is felt warmly on our back. In this eventide there emerge images of those with whom we have struggled to reach this terrace. Some no longer sit with us as we contemplate a further climb.

> For some we loved, the loveliest and the best
> That from his Vintage rolling Time hath prest,
> Have drunk their Cup a Round or two before
> And one by one crept silently to rest.

In 1949, at what now seems an early age of 60, Clarence Olds Sappington silently departed from the summit to which he aspired. Just five years later was established this Memorial Lecture, a recognition seldom accorded any man so soon after his passing.

Rightly some of you may ask, "Who is Doctor Sappington? Why should he be honored annually by the Industrial Medical Association?" Those of my generation would not ask these questions any more than we would ask, "Who was Sir William Osler?" Quite probably many of you have not heard or read previous Sappington Memorial Lectures, of which there have been seven. Reviewing these, I find that only two of my predecessors pictured him with any intimation of an intimate friendship. I shall indulge in a brief commentary to justify this *in memoriam*. His life-time work was in the interest of the three components represented by this conference—occupational medicine, industrial hygiene, and industrial nursing.

The man we honor at this hour was the first person in the United States to receive the Doctor of Public Health degree in industrial hygiene. He was the first to receive the coveted Knudsen Award. He was one of the first to conduct a course in industrial hygiene in a medical school. He was one of the first editors of one of the first journals dedicated to the broad field of industrial health. These and other "firsts" are sufficient reason for today's recognition.

Thus it would seem that Clarence Sappington was a seriously dedicated man. He was! He also was extremely witty, with a personality that would enliven any gathering. He was an excellent teller of tales, somewhat a Bennett Cerf of medicine. Although he played the bass viol in several symphony orchestras, such as the Bohemian Club in San Francisco and one

Presented at the Forty-Sixth Annual Meeting of the Industrial Medical Association, Los Angeles, Calif., April 11, 1961.

Dr. Johnstone is Clinical Professor of Industrial Medicine, University of California, Los Angeles.

in Chicago, he was no long-haired musician. All of us have experienced the tedium of conferences or committee meetings. During any recess from such Sappington could always locate a piano. He would play any popular tune that came to his mind or one suggested by the off-key singers gathered around him. These were delightful interludes.

If time permitted it would be interesting to relate a few of my personal experiences with this man. I shall recall only my last. After the Ramazzini Rendezvous we drove from Muskoka Lake to a Detroit hotel where Clarence, Mrs. Johnstone, and I had rooms on the same floor. After dinner he sat in our room recalling persons whom he knew and events, as he had done for years in his well-known column, "Doctor Pilgrim." Then he reverted to a sorrow that had rested heavily upon his soul for five years, the loss of his son Jack in the Battle of the Bulge. On his coat over his heart he wore, as always, the little bar of the Purple Heart. With tears in his eyes he arose and said, "I'm off to bed to read my Bible, good night." With that Clarence Olds Sappington walked down the hall and out of our lives—but not out of our memory. Only a few weeks later he joined his son Jack to enjoy eternal peace.

Obviously a memorial lecture should be more than a eulogy. From the life of him whom we eulogize we should be able to extract a connotation justifying this hour of dedication. Dr. Sappington began his career in occupational medicine over 40 years ago. Only a few physicians preceded him in this field, and, when we compare ours to the edematous ranks of other phases of medical practice, relatively few have followed him. Why is this? Why is it that even today not only laymen but also those within the medical profession ask, "What is occupational medicine?" It is my contention that occupational medicine is *a captive specialty*. Let us examine our status through the perspective of time and circumstance.

One of the first actions taken by the newly formed American Medical Association in 1847 was to create the Committee on Medical Education,[1] now known as the Council on Medical Education and Hospitals. During the initial years of its existence it was perturbed over the almost universal poor quality of medical education in the United States. There is no need now to review the factors that permitted this sad situation. It is noted that despite all attempts on the part of the Council to correct a defective condition, very little improvement occurred.

In 1908 the Council on Medical Education took advantage of the opportunity afforded by the Carnegie Foundation for the Advancement of Teaching. This inaugurated the Carnegie study under the able direction of the now long revered and recently deceased Abraham Flexner. The influence of the famous Flexner Report is known to everyone interested in medical education. Less known and thus less appreciated but of great significance was the subsequent emphasis placed upon "continuing education," that is, graduated education propounded by Ray Lyman Wilbur of Stanford during his years as Chairman of the Council on Medical Education. The purpose of this brief reference to the past is not without point for in it we find a parallel to our present predicament.

Last September (1960) in an address at Dartmouth College, Ward Darley[2] stated: "The revolution in medical education that followed the Flexner report of 1910 was really precipitated by the fact that the then-developing body of scientific knowledge was not being translated into medical practice by the then-existing system of medical education." I wish to repeat a portion from that quotation, namely, "*was not being translated into medical practice.*" "The gap between what was known and what was taught was unnecessarily wide . . . and now, fifty years later, we find again that medical education has much in common with the era of the Flexner report—the gap between what is known and what is taught becomes wider than can be justified. But this time the gap is widening for reasons that differ from those that accounted for the difficulties a half century ago, for instead of suffering from the blight of pedestrianism we are belabored by the fruits of progress—progress within medicine itself and progress within the society in which medicine must serve."

What are the fruits of progress with which medicine is presently belabored? There are several but foremost is scientific research. Many of us recall those silent men in medical research who worked without adequate money or space, without a date-line for accomplishment, and without anyone or any group specifying the nature of the research. The researchers of that earlier day were pursuing ideas of their own. These men were also our teachers and worked with us in the laboratory. What little financial support they received came from the institution in which they taught.

Today most research is *project research*. It is a big enterprise demanding of time and money. Its financial support is derived from philanthropic grants, foundations, the government, and the individual contributions of the American citizen. The money donated in America to charitable purposes of all kinds during

1959 amounted to $7,800,000,000, an increase of $700,000,000 over 1958. Of this amount, $6,100,000,000 came from individual donations. Over $2,400,000,000 went for health and welfare causes. The shocker in these statistics is this—the amount of money spent annually on medical education represents only 1% of the expenditures of health services in this country.

The federal support of the National Institute of Health has increased annually. The last Congress voted an appropriation of $106,000,000 *more* than in the previous year, an increase of 36%. In signing the measure, President Eisenhower evidenced considerable concern. He feared that the measure might (1) lower the quality of the projects supported by increasing the flow of grant applications more rapidly than procedures for their careful appraisal could be effectively adapted; (2) cause too great a diversion into research of the manpower and other sources needed for equally vital teaching and medical education.

In their book entitled "Medical Education in the United States at the Mid-Century," Deitrich and Berson[3] list the hazards of project research grants. They observe that there is a tendency for research to be isolated from the teaching program; that the students in medical schools are nearly completely unacquainted with work that is being done in their own institution; and that many of the faculty spend a larger portion of their time in research and less in their teaching function.

Now it does not behoove me of simple mind to castigate research projects, nor is there such an intent. However, those of us who are engaged in teaching clinical medicine are perturbed with the increasing imbalance in medical education resulting from the adulation of medical research. The effect of this imbalance upon the teaching of occupational medicine will be noted subsequently. The foregoing observations serve to introduce the first of several contentions that occupational medicine is a captive specialty.

Captive Area I—Undergraduate Education

In 1938 at the San Francisco Convention of the American Medical Association your speaker read a paper entitled "Industrial Medicine's Challenge to the Internist."[4] In that published paper is the following paragraph. "Another barrier has been the pattern of medical education. A few didactic dissertations crowded grudgingly into a course in preventive medicine and hygiene constitute the student's sole contact with any phase of occupational medicine."

That was 1938. In 1954 the Industrial Medical Association, by the questionnaire method, obtained information on the status of the teaching of occupational medicine as of that time. In 1960 Dr. Felton sent the same questionnaire to medical schools in the United States and Canada. It is not possible at this time to present his tabulations which appeared in the July, 1960, issue of the JOURNAL OF OCCUPATIONAL MEDICINE.[5] From the information obtained, Felton makes one significant observation, namely, "although the total number of schools giving instruction has increased, there has been a drop in the total number of hours of instruction in occupational medicine, per school, from 17.7 in 1954 to 12.8 in 1960." It should be noted that whenever a few hours are devoted to the subject of occupational medicine, invariably it is done so in the department of public health, where the purpose is to acquaint the public health officers rather than those who will enter general practice.

Why this drop in the total number of hours of instruction? It would seem that with the rapidly increasing industrialization of our nation, greater emphasis should be placed upon the several disciplines that teach the prevention of occupational diseases, or the recognition of such, rather than deemphasis. To supply the answer is not difficult. Occupational medicine is held captive by the curriculum committee. These men of good intent but often of too long tenure are backed against the wall by chairmen of long-established specialty departments decrying any diminution of their teaching hours, or they are demanding more time. In some instances they fear a curtailment of their program due to the inroads of research, and in other instances they foresee a need to increase their hours because of what research has dropped in their laps as, for example, cardiac surgery.

Recently Arthur Richardson,[6] Dean of the Emory University School of Medicine, said that "most of us are tired of hearing a medical school compared to a stool with three legs, representing education, research, and service. It is a poor analogy. In these days of expanding research grants, we are inclined to forget that the single central function of a medical school is education. It is possible for a school to have too much research."

From what has been said to this point, it is not difficult to envision the position of occupational medicine in undergraduate education. It is held captive by the proponents of research and by those who oppose the inroads of research. Likened unto the stock exchange, these department heads sit in seats purchased by time. They are hostile to being unseated or to sharing a portion of the seat. Occupational

medicine occupies no established seat inside the halls of undergraduate teaching. It has its foot in the door—and no more.

Unfortunately, those of us who advocate a greater recognition of occupational medicine in undergraduate teaching find ourselves in a paradoxical position. Even if our plea were granted, we are faced with a situation wherein there is a paucity of professors with any background or experience in this phase of medicine. Certainly this is true of most professors of preventive medicine to whom this subject has been assigned, if at all.

But consider this. Today there are six schools that provide excellent graduate training in occupational medicine. The total number graduated in the past few years I do not know. But —I ask you—what happens to these men amply prepared to teach? Almost all of them become medical directors and remain so. Very few seek affiliation with teaching centers.

Captive Area II—Ineffectual Communication

My first few remarks in this segment of the discussion are not facetious. Almost every mid-afternoon of a Sunday, as we doze, the doorbell rings. With some certainty we know it is someone seeking a donation to the Heart Fund, the Cancer Fund, Multiple Sclerosis, and so on. We have been prepared by all media of communication. Even when no drive is on, medical research is depicted in such a manner that its drama is inescapable. At almost all ages and levels of intelligence are discussed the miracles of modern surgery and the marvelous efficacy of our drugs. Any child able to read is versed in the progress of medical research. That no one discommends.

However, in addition to the benefaction bestowed upon them by the aforementioned type of medical research, 70 million workers in this land of ours are, or should be, the recipients of preventive health principles and practice stemming from intensive research in industrial toxicology. These workers, the public, and most of the medical profession are almost completely unaware of this phase of medicine. This research is no shanty study. It involves the disciplines of clinical toxicology, biochemistry, pathology, physiology, epidemiology, and biostatistics, and the skills of the veterinarian. It requires a vast outlay of money. This type of research is dedicated to preventive medicine, which is the primary objective of occupational medicine.

Ladies and gentlemen, you of nursing, industrial hygiene, and occupational medicine, here is a story that *is not* being told to the public or the profession. Even more to be lamented is the fact that the knowledge derived from this source of research is not being translated into the general practice of medicine. The practitioner and those engaged in the numerous specialties continue frequently to base their opinion regarding the etiology of an alleged occupational disease upon some statements found in the medical literature, even though it stems from a former age or area in which scientific toxicological research and the discipline of epidemiology did not exist. This is costly to the worker, to industry, and to the public.

Also we lack contact with the profession in the literature that reaches the doctor's nightstand. Those in our field who write articles most often seek publication in journals devoted to our phase of practice. We tend to ignore *The Journal of the American Medical Association,* GP or specialty journals in other fields. We write to ourselves.

Then, although no fault of ours, the increasing number of medical news magazines (sent to the profession gratis) accentuate the spectacular in medical research. Seldom do they present the decline of those serious occupational diseases that once rendered the industrial worker a pitiful, disabled, unproductive citizen. Seldom do they acknowledge the statistical evidence of the practice of preventive medicine in industry.

Finally, on the subject of communication I refer to a pet peeve of mine, namely, the character of our national, state, and county society programs. These reek with redundancy. On these programs subjects dealing with occupational medicine are rarely presented. They prefer to din our ears with such subjects as cholesterol and a fat-free diet *ad infinitum.*

Captive Area III—Behavior of Physicians in Industry

The physicians in industry abet this state of captivity of which I have been speaking. Although this criticism has a general application, it is especially true of most medical directors. They tend to isolate themselves from their confreres in other fields of medical practice. Too many avoid hospital staff responsibility or fail to participate in their county or state society functions. Within their domain there is a wealth of clinical material that could be presented before a community hospital staff or made available for teaching purposes. Certainly here again is an example of failure to translate what is known to those in the general practice of medicine.

Let me be most emphatic that the theme of this thesis be not misconstrued. The caption,

"Occupational Medicine—The Captive Specialty," does not imply that this phase of practice is unrecognized as a specialty. Certification in Occupational Medicine under the American Board of Preventive Medicine became a reality in 1955. My point throughout this paper is—having achieved status, our stature remains desolate. Occupational medicine has been retarded or held captive by circumstances previously delineated.

Suggestions

It is not possible within the time allotted to develop a design of achievement that all of us seek. Disregarding other mentioned areas of our captive state, I shall end this discourse with only one reiteration. Ours *is* a medical specialty. Other medical specialties fully participate in undergraduate education; to any appreciable degree occupational medicine is not permitted to do so. It is obligatory that education in any field fulfills the requirements born of a constantly changing socioeconomic order. Medical education is no exception to this truth. Furthermore, no other specialty in medicine is *more relative* to the socioeconomic structure of our time than is occupational medicine. Therefore it would seem advantageous to the industrial worker and the public that the embryonic physician be instructed in this phase of medicine.

With this contention a few of our pioneer teachers in the field of occupational medicine are not in complete agreement. As indicated earlier, they feel that, by and large, medical school faculties lack competence to teach this subject and therefore we should await the student who gets the message or hears this clarion call and then, because of such, enters graduate training. To me this philosophy does not satisfy the existing urgency. Again to reiterate a previous observation, these graduate students become medical directors who carry out the preachment of preventive medicine within their own company but rarely translate what they have learned to those in medical schools or to the community physician.

At the moment it is foolhardy to envision any adequate undergraduate teaching program in occupational medicine within the immediate future. But we could and should seek the indoctrination of acquaintanceship. To this end there are several approaches. In an article in *The Journal of the American Medical Association* in 1940 I suggested the utilization of a system simulating Hollywood's Central Casting Bureau. More recently Ashe[8] recommended "infiltration" in undergraduate education. Both articles presented a method of informing the various departments of medicine of the presence and availability of clinical material existing in the medical center at any given time. More specific details are to be found in the papers referred to in the bibliography appended to this article.

Conclusions

Occupational medicine, originally called industrial medicine and probably soon to be designated as environmental medicine, was born of necessity. It was medicine's response to a requirement imposed by the first social legislation enacted in the United States. In the early days of industrial medical practice there existed a stigma. This is no longer present. What is present is the absence of a deserved recognition fitting to a present-day need. The workers of American deserve competent care. This can be procured only when all practitioners are tutored to render such care.

I conclude with this exhortation. Some weeks ago I heard a speaker lament the apathy of the American public over conditions periling this nation. His subject was "Awaken the Town and Tell the People." To all of you everywhere let me paraphrase that into my message—Awaken the Profession and Tell the Students.

(The author's address is 520 W. Seventh St., Los Angeles, Calif.)

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Human Factors and the Work Environment

A Symposium Presented by the New York State Society of Industrial Medicine, Inc., September 28, 1960

I. INTRODUCTORY COMMENTS

Leon J. Warshaw, M.D., New York, N.Y.

IT HAS long been recognized that one of the basic prerequisites for the modern practice of occupational medicine is an intimate knowledge of the work environment. Years ago, when the industrial physician was concerned almost exclusively with work-related injuries, this knowledge was rather easy to acquire. An understanding of the causes of accidents and of measures capable of preventing them was all that was then required. While modern technology lightened the physical burdens of the worker and made it easier to guard him against physical trauma, it also created new problems. The industrial physician now is required to recognize and control a multitude of chemical, physical, and biologic agents that can have adverse physiological effects.

Today, the ever-broadening scope of occupational medicine presents the physician with new challenges. It is no longer enough to prevent *disability;* he must now also be concerned with problem of promoting *ability.* His goal is no longer simply the maintenance of health, important and fundamental as that is, but also the enhancement of productivity. In other words, the function of modern occupational medicine is not merely to keep workers healthy and on the job, but also to help them to maintain an optimal level of productive efficiency.

Thanks to modern machinery, electronic equipment, and automation, the productivity of a worker no longer depends solely on such physical factors as manual dexterity, strength, and endurance. Many individuals with marked physical impairments can successfully keep pace with or even outstrip their healthy coworkers in performing many of the jobs in modern industry. The gathering and analysis of information, planning, designing, and decision-making are frequently at least as important, if not more so, as fabrication and assembling. This is certainly evident to this audience, so many of whom provide medical services to industrial organizations largely if not entirely staffed by "white-collar" workers and executives.

Obviously, this broader goal requires a much more comprehensive knowledge of the work environment. In addition to elimination and control of health hazards and concern over plant sanitation, the industrial physician must become familiar with the factors in the work environment that can affect the productive capacities of the personnel under his supervision. He must be aware of their influence on mental and emotional as well as physical functions. He must learn how to promote the subtle environmental influences that enhance the motivation for improved work performance and to counteract those likely to impair it.

This is no small assignment, for much of the essential knowledge has yet to be acquired. In the papers that follow, we shall consider a number of environmental factors that often have a considerable influence on the workers exposed to them. These are not offered as definitive, comprehensive summations of their subject matter. We hope, rather, that the consideration of their implications will stimulate the development of more effective controls of environmental factors and lead to their application in our daily practice.

The effects of isolation and of confinement on submarine personnel are presented by Dr. Weybrew who had the unique opportunity of observing the crew of the *Triton* during its famous 83-day underwater cruise around the

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world.* He describes how such observations and the data derived from experiments in simulated submarine environments are used to develop techniques for evaluating the fitness of volunteers for this kind of duty.

The proper selection of personnel is obviously a key factor in the successful accomplishment of such feats as the *Triton's* submerged circumnavigation of the world, the *Nautilus* cruise under the polar ice-cap that preceded it and, to go in another direction, the forthcoming journeys of the astronauts into space. Justifiably hailed as exploits when first performed, such ventures very quickly become routine operations upon which the nation's defense may depend. When the glamor and excitement of a pioneering effort are absent, isolation and confinement can be expected to affect personnel much more readily. How to offset any adverse influence on the ability of men to live harmoniously and to work efficiently in such environments and how to weed out those who are unable to function adequately under these conditions are problems to which Dr. Weybrew and many of his colleagues have been addressing themselves.

It should not be inferred that isolation and confinement are environmental factors with which only the military services and the space scientists need be concerned. Actually, they are encountered in almost every industry. Telephone operators, vault guards, and personnel manning control rooms in broadcasting stations, radio transmitters, pipelines, and power generators are only a few of the categories of workers who may be exposed to them. They play a particularly important role in certain electronic and pharmaceutical operations that require dust-free and germ-free environments. The reactions of the submariners that Dr. Weybrew describes, therefore, may explain some puzzling aspects of the behavior we may have observed in certain of these workers.

In the second paper, Mr. Harris draws upon his extensive experience with the Atomic Energy Commission to present a new and provocative aspect of the problem of protection against radiation hazards. He shows how, in certain circumstances, the implicit threat of this new and fearsome environmental contaminant and the extravagant measures taken to control it may affect a group of people more than the amount of radiation to which they could be exposed if no precautions were exercised. It is a rare experience, you will agree, to hear an expert warn against paying too much attention to the subject in which he specializes.

Before anyone rises to accuse Mr. Harris of disloyalty, let me stress that he is not acting as a "devil's advocate" to urge the total abandonment of radiation control measures. All he asks is that they reflect the kind and amount of radiation to which individuals might be exposed rather than the fear and anxiety aroused in them by their abstract concept of radiation as a destructive force. He pleads, too, that attention should not be given to radiation controls at the expense of ignoring a sometimes even greater danger from a more prosaic contaminant of the working environment.

There is one point of singular importance that Harris neglects to emphasize in his paper. It reflects, I think, not modesty, but rather the matter-of-fact expectation of the expert that his work will be well done. I refer to the remarkable record achieved by the doctors, industrial hygienists, and scientists engaged in radiation protection. I cannot think of another industrial product or process of comparable toxic propensity that has been handled with so low an incidence of accidents and injuries. Regardless of the reasons, even if it is a product of the unreasoning fear of radiation that Harris decries in his paper, it is a striking example of what can be accomplished by modern industrial hygiene.

In the last paper, we go from such realms of "classified" information as the Armed Forces and the Atomic Energy Commission to the "unclassified" subject of office planning. This is an area in which every person is an "expert," whether his concepts are based upon the precepts of avant-garde art and design, pseudoscientific and half-baked psychologic theory, or the fundamentalist credo of "I know what I like."

It is also a subject that affects every worker from the housewife who longs for her "dream kitchen" to the clerk who navigates the longest or the shortest route from his desk to the washroom, depending on the purpose of the journey.

Much attention has deservedly been paid to problems of factory design and plant layout. Experts have studied products and production methods and have analyzed jobs in terms of the effectiveness and safety of the workers. The result has been tremendous increases in productive efficiency that have saved struggling

*Those who would like to know more about Dr. Weybrew's adventures during this exciting voyage will find the published excerpts from the log of the *Triton* most interesting. This book, "Log of Triton Circumnavigation," may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. No. D201.2:T 73. Price, 45 cents.

industries and have even created some new ones. The fact that attention to the planning and design of offices and office equipment can bring similar gains in productive efficiency is being increasingly appreciated. After all, every industry has its proportion of office workers and some, such as insurance, finance, and government, the greatest industrial giant of all, are operated almost entirely by employees who fall into this category. Drawing upon decades of experience in widely varied types of industries in all parts of this country and abroad, Mr. Gad pungently describes some of the fundamental problems that confront him when he is called in to guide a company to the most effective design for its offices. His entertaining comments will interest the industrial physician, since these problems not only affect employees' health but also influence the design of the medical department in which he treats them.

Before turning to the individual papers, it should be noted that their authors are not physicians. The first is a psychologist (Dr. Weybrew), the second an industrial hygienist (Mr. Harris), and the last, a consultant in office planning (Mr. Gad). This was planned deliberately to dramatize the fact that modern occupational medicine requires a variety of skills that no single physician could hope to master.

In addition to the fields the authors represent, one may mention the industrial nurse, the safety engineer, the industrial toxicologist, the health educator, the chemist, the physicist, and many others. Every industrial physician, regardless of his diagnostic acumen and therapeutic effectiveness, must integrate their knowledge and their abilities into his daily activities. Their contributions are vital to the success of the modern comprehensive occupational health program.

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II. THE IMPACT OF ISOLATION UPON PERSONNEL

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THE PURPOSE of this paper is to outline, somewhat cursorily, the adjustment problems which face personnel living in or under isolated conditions. Although my comments are of necessity tentative, I shall try to answer, so far as the factual evidence will allow, the following two questions: (1) What happens psychologically and physiologically to humans living for prolonged periods of time in relative isolation? and (2) What evaluation standards are most efficacious for selecting humans whose probability of maladjustive breakdown is minimal under isolated conditions?

Let us consider for a moment the theoretical implications of adjustment to what has been called a sensory-deprived or sensory-impoverished environment. There is now considerable literature reporting experiments showing the effects of "sensory deprivation upon human and animal behavior." Let me be clear at the outset that, so far as is known, there is no possible way to remove all sensory input to humans short of death or deep anesthesia. What is meant, of course, is that the amount and variability of the stimulus input is reduced.

There are three lines of evidence for the effects of isolation of this kind: anecdotal literature, shipwreck survival and the like, laboratory studies, and studies aboard prolonged-submerged submarines and isolated aircraft. The discussion will follow in that order.

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Survival Reports

The anecdotal literature is replete with instances of delusional behavior, hallucinosis, suicide, cannibalism, and the like. For example, Walter Gibson so vividly described in his book "The Boat" the four survivors (out of 135) who remained several months on a liferaft. Grotesque delusions, suicide, and cannibalism were all reported.[3] Similarly, Joshua Slocum on his lonely trek across the South Atlantic, reported delusions of a helmsman guiding him through the stormy sea.[7] Others in Arctic isolation have reported hallucinating monsters and monomanias to dash out in the snow even if it meant sheer disaster.[1, 5] This information, though of questionable validity, suggests (1) that severe perceptual changes are the most probable effects of isolation, and (2) that if isolation is extremely protracted, controls over intense antisocial impulses might become inadequate and indeed nonexistent.

But as scientists, we distrust this method of reporting phenomena largely because we know the effects of repression and denial upon memory. Instead, we look to the laboratory for more valid observations of the behavioral effects of isolation.

Laboratory Studies

In 1954, Dr. Hebb of McGill University conducted the first "Isolation Experiment" involving the incarceration of 24 men singly in a sound-proof chamber.[4] Each subject sat alone with sights, sounds, and tactual stimuli maximally reduced. The results were indeed spectacular. First, earning $20 per day was not a sufficient incentive for the subjects to remain in "isolation" for more than three days, most of them remaining only for a few hours. Weird visual and auditory hallucinations and delusions, some of which contained geometric and animated images, were reported. For example, one person reported that he saw "squirrels with packs on their backs." Depersonalization, delusions in which the person experiences detachment of parts of the body, were also reported. One person reported his head felt like a ball of cotton, and that his limbs were detached. Too, after four to six hours of isolation, almost all subjects reported inability to concentrate on a given task. There was also some minor intellectual impairment as determined by psychological test data obtained following the experiment. EEG recordings from the occipital region of the brain showed an increase in low frequency waves.

Interestingly, however, other similar studies have failed to show the extreme perceptual and cognitive changes reported by the McGill group. For example, an Air Force study performed in 1959 involved the isolation of 53 subjects one at a time.[6] Emphasizing the psychiatric aspects of adjustment to isolation, these researchers reported a general increase in regressive behavior. An increase in the intensity of hostile feelings and preoccupation with food and sexuality were also part of the major findings reported.

From these and other studies have emerged a rather comprehensive behavioral theory. Theoretically then "organismic integrity is a function of the level and perhaps variability of stimulus input." Expose the organism, human at least, to an environment which provides minimal exteroceptive stimuli, and mild to acute decompensatory behavior may be expected. An interesting extension of this theory to the neurophysiological domain holds that brain function depends upon a continuous arousal reaction generated and maintained in the reticular system and the reverberatory circuits between it and the hypothalamus and cortex. Presumably this arousal reaction depends upon continuous sensory input. From this theoretical formulation, a working hypothesis relevant for submarine psychology has emerged, namely, that this "need for stimulation" is motivational and therefore a sensory-reduced situation becomes harshly frustrating, hence maladjustive.

With the results of these and similar studies and the theorization that followed as background, the research program of the Psychology Branch of the Naval Medical Research Laboratory at New London began to focus on the problem of prolonged confinement in submarines. At the outset it should be realized that the submarine environment is not an isolated environment, in the sense that external stimuli are eliminated or even greatly reduced. But the stimulus input is repetitious, invariant, and ofttimes monotonous. In our work in the area of "submariner confinement," as we call it rather than isolation, we assume that the effects of an invariant stimulus input are alike in kind but different in degree to those effects observed in a stimulus-impoverished situation. Accordingly, a number of both laboratory and field studies have been done to identify the major stresses which affect human adjustment to prolonged submergence.

The research staff first turned to laboratory studies to examine several specific questions. In the first study, the relationship of a repetitious, presumably monotonous, environment upon vigilance was examined.[9] Briefly, a group of human subjects were placed in an isolated room and asked to respond repetitiously to a pointer moving in a circle at the rate of one revolution a minute (the rate that a radar scope revolves). Each was to press a button every 90 degrees of arc, four times a minute, while the pointer moved about 3 degrees of central angle, or within a time span of 450 milliseconds. Those in the experimental group pressed the button every 15 seconds not knowing whether or not they pressed it on target. Those in the control group, however, had information fed back to them as to whether they were pressing the button at the right time. Our hypothesis was that the group being "fed back" information concerning the appropriateness of their response maintained a higher vigilance level than the group who was responding without any knowledge of the consequences of their behavior. In addition to the number of accurately timed responses as a measure of vigilance, the electrical conductance of the skin was also recorded continuously during the experiment. This bioelectrical measure is known to be related to the general reactivity of the sympathetic nervous system, which, in turn, has been shown in the literature to be a reliable indicator of the general excitation level of the organism. The results in Fig. 1 suggested strongly that environmental "feedback" as to the conse-

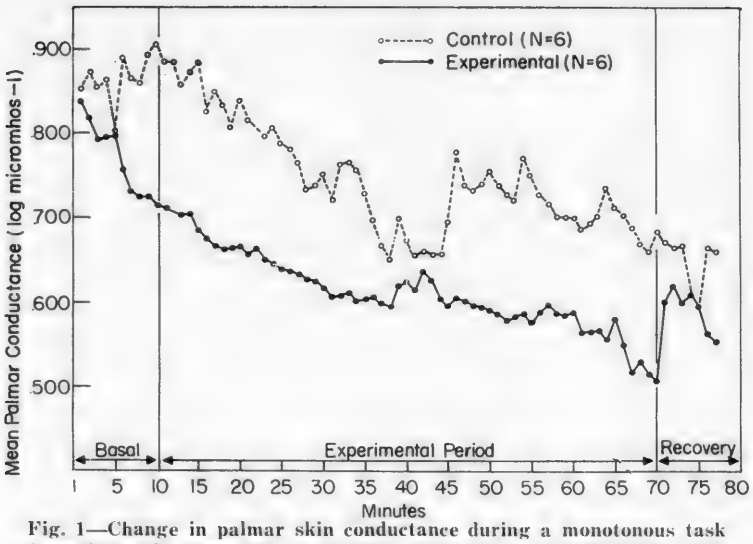

Fig. 1—Change in palmar skin conductance during a monotonous task (experimental) compared to changes during a non-monotonous task (control).

quences of repetitious activity was an important factor in maintaining vigilance as measured in this study. These results may have implications for the problem of maintaining the high level of vigilance needed by operators of the technologically complex apparatus used in the operation and maintenance of an atomic submarine.

Again utilizing the bioelectrical response of the skin as an indicator of the functional characteristics of the autonomic nervous system (A.N.S.), a second laboratory study showed a significant correlation between the amount of skin resistance change and the rate of recovery to basal level following stress and the presence of personality traits related to emotional stability.[10]

As a result of these laboratory findings, the staff is now exploring the feasibility of using some indicators of individual differences in A.N.S. function as predictors of the ability to adjust optimally to long periods of submerged confinement. The approach now being used in the assessment of Fleet Ballistic Missile submarine crews is to measure A.N.S. reactivity and recoverability to experimentally induced perceptual conflict. The problem of selecting men for isolated living will be treated in more detail later in the paper.

Submariner Confinement

The first major operational study, as they are called in military research, involved the confinement of 23 men for a period of 50 days in a sealed submarine containing a high concentration of carbon dioxide in the ambient air.[2] Completed in 1954, this experiment showed no significant decline in psychomotor or manipulative ability in the 23 men tested biweekly throughout the experiment. The results did show, however, (1) a significant decline in personal motivation (and hence group morale); (2) an increase in interpersonal irritability; and (3) an increase in muscular tension with concomitant sleeping difficulties.

As to the physiological effects of the 50-day confinement, there appeared, presumably as a result of the high CO_2, an increase in urinary carbonates and a shift in the electrolyte balance of the blood. There were, however, only minimal changes (not statistically significant) in the usual endocrine stress indicators such as adrenal cortical steroids and protein metabolites in the blood and urine.

With the results of these studies in hand, a series of operational studies aboard submarines was begun. To date, these have included the 11-day submergence of *Nautilus* in 1956, the 60-day submerged cruise of *Sea Wolf* the next year, the *Nautilus* cruise under the polar ice cap in 1958, and the 83-day submerged circumnavigation of the world by *Triton* in 1960.

Some important findings related to the psychophysiological effects of confinement resulted from the 11-day submergence of the *Nautilus*.[9] In the first place, objective indicators of muscular tension rose concomitantly with symptoms of insomnia after three or four days' confinement. There appeared also an apparently unexplained increase in resting heart rate after seven days' submergence. No change in vigilance as measured by critical flicker fusion rate was observed, however.

The most recent study of this type was made aboard the *Triton* during the world circumnavigation.[11] Two experiments were conducted in person by the author and by the *Triton's* physician, CDR James E. Stark. One brief study completed after 60 days of the 83 days' confinement was designed to assess the contribution of tobacco smoke to the contamination of the sealed-ship's atmosphere. More importantly perhaps, the study attempted to determine the psychological and physiological effects upon habitual smokers (those who smoked more than two packages of cigarettes per day) of an enforced "no-smoking" period. While of only indirect relevance to the problem of isolation,

the findings of this experiment showed that no-smoking curfew (coupled with confinement) did effect the "habituates" adversely in terms of exaggerated irritability, tension, and insomnia. Blood pressure and pulse rate, while significantly higher for the smokers as compared to the non-smoker control group before the period when the "smoking light" was out, did not show any greater margin of difference during the experimental period.

The second study conducted during the *Triton* voyage involved the collection of a daily symptom check list from a sample of 50 men of the crew. From these daily records of moods, tensions, anorexia, insomnia, irritability, motivation level, eye irritation, etc.—51 symptoms in all—it was possible to assess the psychological condition of the men *each day* of the 83-day submerged cruise.

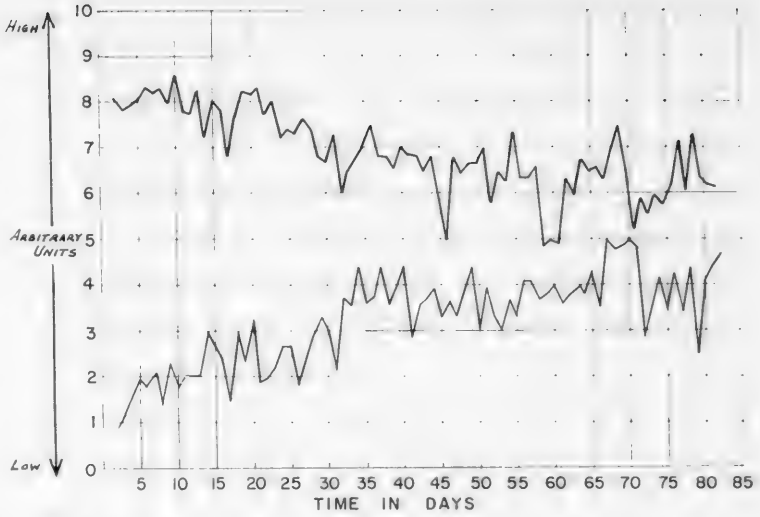

Fig. 2—Group morale (upper graph) and homesickness (lower graph) plotted by days during the first submerged circumnavigation of the world by the submarine Triton.

Although the approximately one-quarter million responses collected during the cruise have not been completely analyzed at this time, some preliminary findings are available. It is seen from Fig. 2 that personal motivation, and consequently group morale in general, showed a declining trend after 10 days of confinement. Concurrently, homesickness rose. Interestingly, the height of morale appeared to be an inverse function of the degree of regimentation imposed, morale being highest on Sundays, when more than the usual free time was allowed. On the average, roughly 25% of the sample reported headaches of undetermined origin on any one day. Tensions, interpersonal irritability, and sleeping difficulty rose some, but for most of the crew, not to a serious degree. Time perception, that is the length of time a minute or an hour seemed, became less accurate as the cruise progressed presumably as a result of the disruption of the usual day-night cycles.

On the more serious side, two or three persons experienced anxiety reactions acute enough to demand medication. One person showed obsessive thinking which decompensated into a rather intact delusional system as time progressed. But there was no evidence of definite hallucinating or weird delusional behavior as were reported in the McGill studies mentioned earlier. However, it cannot be gainsaid at this time that complete analyses of these data may yet disclose additional, and perhaps conflicting, evidence of the psychological effects of prolonged confinement.

Selection of Submarine Personnel

It is a well-established fact that some individuals adjust more adequately to confinement than others. How are men selected with maximum probability of showing optimal adjustment to confinement of the kind encountered during prolonged submergence? Unlike the other services, each man in the submarine service is a volunteer. This fact alone provides one selector, perhaps a crucial one, related to the man's interests and over-all motivation for the service. Secondly, each man must meet aptitude criteria in the areas of verbal and arithmetical comprehension, and mechanical ability. Made possible by means of psychometric tests, an accurate assessment of each man's aptitudinal "make up" provides the data necessary to predict his ability to assimilate the complex technology needed by the modern atomic submariner. Psychologically this margin of ability is important inasmuch as it reduces the "odds" that he will be confronted with debilitating frustration during his long, and ofttimes arduous, training. Thirdly, the intensity of motivation to obtain the goals or satisfiers available in the submarine service is measured again by means of a psychometric technique developed for this purpose.

The fourth selector involves the general psychiatric status of the men at the time of volunteering for submarines. By means of a psychometric test designed for this purpose, an evaluation of each man's major conflict areas,

the frequency and severity of his neurotic symptoms, and his main defense dynamisms are made possible. Finally, the fifth selector area, which is in the experimental stage, involves an assessment of each man's somatopsychological nature, in particular some index of the reactivity and resiliency of his autonomic nervous system. Thus, from the interaction of these five selector factors, reason for volunteering, aptitudinal level, motivational intensity, psychiatric status, and somatopsychological "make-up," we have been able to reduce failure in the submarine service for psychological and/or psychiatric reasons to less than 10% as compared to the probable attrition of 40% or more expected in an unselected population.

Summary

In summary, this paper attempts to survey the literature pertaining to the effects of isolation upon humans. Radical isolation may be seriously disruptive particularly in the perceptual and cognitive areas. During the confinement of prolonged submergences, many submariners show decrements in motivation and in the effectiveness of their interpersonal relationships. Quite possibly some undesirable psychophysiological changes also occur. For most men, however, these effects are not seriously debilitating. Our research argues for the use of precise assessment techniques to be applied to the problem of selecting men with maximum potentiality to adjust to the stresses encountered during prolonged exposure to an isolated environment.

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III. OPERATIONAL, EMOTIONAL, AND LEGAL PROBLEMS IN THE APPLICATION OF MAXIMUM PERMISSIBLE RADIATION DOSE

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IT IS APPARENT to those engaged in the field of health protection that among the many hazards of modern living, the ones posed by the use of radiation and radioactive materials are, in general, treated far less realistically than are others. It is therefore useful to examine the differences between radiation hazards and all others to see if we can understand the reason for this great difference in popular concern. Perhaps if we could understand it, we might better be able to bring the radiation hazard into a more realistic perspective.

George F. Jenkins, assistant to the vice president of Union Carbide International, has compared the inception of the nuclear age to the first use of fire, saying: "It is not impossible that when fire was first introduced to mankind by the brave few pioneer researchers in a remote age in the history of mankind, they could have been subject to the critical remark, 'Boon to mankind, ha! One of these days it will get loose and burn up the whole world.' " He states: "The question of safety and the additional costs which result from stringent regulations of the regulatory agencies should be closely examined . . . . Certainly with adequate and reasonable precautions human life can be safeguarded without the imposition of one supersafeguard upon another which continues to increase the cost of radiation operations to the point where they become wholly uneconomical and unprofitable."

Dr. Raymond E. Vener, process consultant to Catalytic Construction Company, has stated: "Economics of atomic radiation applications

Mr. Harris is an environmental health consultant and Mr. Blatz is with the New York City Office of Radiation Control.

are closely related to provisions for shielding, handling of radioactive materials and isotopes, disposal of wastes, and maintenance." It can therefore be seen that not only the health and safety of the public but the economic future of this industry rests in the hands of those responsible for protection.

Let us examine the inherent differences between this and other types of industrial or public health hazards. Vener also stated: "Since radiations cannot be physically sensed by sight, feel, taste, smell, etc., there are natural concerns, misunderstandings, and confusion on the part of the public." This, however, is only one aspect of the difference. Another very important area of difference is the extreme difficulty in a clear comprehension of radiation magnitude. In general, one is not questioned about the amount of radiation or radioactivity present, but rather, simply "Is it radioactive?" The spread between microroentgens and the lethal or damaging dose and the confusion engendered by the use of the various measuring units—rem, rad, rep, roentgen, curie, disintegrations per second—in all of their various multiples and submultiples, make the understanding of permissible dosages much more difficult than the simple parts per million or milligrams per cubic meter used in other health protection specialties, and many of you must understand the difficulty of placing even these units in proper perspective in the lay mind.

Most measurement techniques used by individuals having the responsibility for health protection have been developed specifically to read a relatively large fraction of the maximum permissible level. It is most usual that if the permissible dose of a chemical is lowered by a factor of 10, one must develop new analytical techniques to determine the new values. With radiation, however, we are faced with a considerably different situation. Our only measurement limitation is natural and instrumental background. Relatively simple techniques are available which can measure differences of 10% in the natural gamma radiation background on an instantaneous basis. One of us, for example, recently paid $30.00 for a device which was capable of detecting these minimum values. Realize in this connection that the acceptable emergency dose is approximately 250 million times this measurement.

The same situation exists with radioactive materials which may be inhaled or ingested. The radioactive material which is believed to have the smallest permissible concentration in air can be detected with ease from a relatively small air sample. Other radioactive materials are, in general, from 100 to 1,000,000 fold less dangerous, and the maximum permissible concentration (MPC) can be determined with correspondingly greater ease.

Enormous amounts of money and effort have been poured into research and investigation of the medical effects of radiation. Despite this great effort there still exists serious disagreement among experts as to the qualitative and quantitative description of these effects. Depending on the body site to which the radiation or the radioactive materials are directed, different radiations have been credited with different physiologic results. These have been described as the genetic effect of radiation to gonads, the life-shortening effect caused by whole body irradiation, and the cancer-producing response which results from the irradiation of certain sensitive tissues. Discussions of such responses are always highly charged with emotion. It should also be noted that even relatively informed people tend to confuse these various responses and have been known, for example, to discuss Sr^{90} in terms of genetic effects and inhaled alpha-emitting materials in terms of their life-shortening properties. It is highly important that responsible individuals who understand these matters be most specific in a definition of physiologic effect, just as one is with the effects of carbon monoxide, lead, or beryllium.

Although there has been much research effort into radiation effects, it might be worth while to examine the statements of the National Academy of Sciences—National Research Council. Let us quote a few sentences from the report "Biological Effects of Atomic Radiation"[1] published in May, 1960. In the discussion of pathologic effects the report states: "Despite the existing gaps in our knowledge it is abundantly clear that radiation is by far the best understood environmental hazard. The increasing contamination of the atmosphere with potential carcinogens, the widespread use of many new and powerful drugs in medicine and chemical agents in industry, emphasizes the need for vigilance over the entire environment. Only with regard to radiation has there been determination to minimize the risk at almost any cost."

Another paragraph, pertaining primarily to genetic effects, states: "Man is now exposed to an exceedingly complex environment and many agents may act to induce mutations. Among these agents may be mentioned industrial effluents, automobile fumes, food additives, drugs, antibiotics, hormones, cosmetics, tobacco, and contraceptive agents." Also, it is stated: "Much of the needed information must come from

studies of a variety of animal species. Eventually, however, the results must be related to man . . . . Some considerations that rise in human populations have no counterpart in animal society." The report goes on to state: ". . . We need to know more about the breeding structure of human populations, the detailed working of selection in them, and the effects of modern hygiene and therapeutic procedures." Another important statement, which is made in the summary, is: "Because of the finding that genetic effects per unit of radiation dose received at a low dose rate might be less than previously estimated, the committee has reconsidered its earlier recommendation. For example, we do not know whether effects of low doses given at high dose rates, as in diagnostic medical exposures, would be more like the response from acute radiation or like that from chronic irradiation." In this connection, it might be well to review the radiation dose to man from various sources at the present time. These estimates are also from the National Academy of Sciences (NAS).[2]

Natural background radiation	42%
Medical x-rays and therapy	52%
Occupational	2.1%
Fallout—gonadal	0.8%
—bone marrow	2.1%
Other sources	0.8%

Not only is the difference between public response to chemical poisons and radioactivity noted by the NAS, but, more importantly, the general public, while it accepts without question the dangers of highway traffic and chemical agents, somehow or other has surrounded radioactivity with an aura of mystery and quasi-supernatural fear. It is difficult to know whether this is a result of the fact that permissible amounts of radioactive materials are generally infinitestimally small mass quantities, or whether it is due to the inability to sense radiations, neither of which reasons are obvious to the untrained. Perhaps it flows from the fantastically simple measurability and the immediate response of an electronic gadget, or perhaps it stems from the fact that the first introduction of the mass public to radiation was from the fact that the first introduction of the mass public to radiation was from the explosion of the first atomic weapon.

In any event, whether for these reasons or for others, public attention has been focused on the subject of radioactivity and its potential danger, particularly in every instance involving accidental exposure of a human to even trivial amounts of radiation. It should not be inferred from the above that we believe overexposure to any hazard is not a matter of concern. Obviously, all reasonable steps should be taken to avoid excess exposure, but let us emphasize the word reasonable. We have reviewed critically a few stories appearing in the public press, as well as the language which has been used in public statements of authority. It appears that if strong efforts are not exercised to keep the subject of radiation hazard in proper perspective with all other hazards of modern-day living, we will not only fail to eliminate, but will intensify, the emotional hazard in the lives of those who are apt to be associated with radiation. This emotional hazard might likely be greater than the hazard we are seeking to control. There has been evidence of this in the reluctance of many individuals to have their teeth examined by x-ray, and even the refusal of some to drink milk or to shake the hand of a person known to have had some contact with radioactive material. A New York dentist tells the story of a grandmother who was reluctant to have her teeth x-rayed because of concern about the genetic effect the radiation might have on her grandchildren. She finally concluded that because they lived in a distant city, perhaps there was no danger.

The following account of several recent incidents which have caught the attention of the public press affords dramatic evidence of irrational reaction to the radiation problem. One episode involved the exposure of a factory worker who had inadvertently placed a cobalt-60 source in his breast pocket for a short time and then transferred it to the glove compartment of his car. A rather detailed reconstruction of the incident by an independent group of investigators resulted in the conclusion that he had received something of the order of 20-26 r (roentgens) of partial body exposure. One of the many articles describing this incident quotes the examining physician as having told the worker: "Now it's begun," and the worker himself has cancelled plans for his marriage because of the fear of subsequent effects on his children. He also has stated that since he believes that the exposure will someday "catch up with him," he now drives his car very carefully so that in case he should become suddenly incapacitated, he will do no harm to others.

These opinions, which we believe are sincere, should be considered in light of the statements given in Bureau of Standards Handbook #59 regarding accidental or emergency exposures[3]: "A body dose of 25 roentgens received all at once is considered to have no effect on the radiation tolerance status of the individual." Detailed accounts of this incident have been published on several occasions and, as far as we know, no one has previously challenged the grossly

mistaken opinions as to the potential effects of this radiation exposure.

Another incident was an industrial accident involving a gamma-emitting radiographic source from which contamination was carried by the workers to their homes. This has been the subject of much publicity, including a nationwide television program. Many homes contain trace contamination by insecticides, drugs, or other chemicals which constitute a far more serious potential hazard than the traces of radioactivity found in these workers' homes. One essential difference is that the traces of radioactive material could very easily be detected, whereas the other materials cannot be.

Another incident involved an industrial explosion in a thorium fabrication plant. Several respirators worn by firemen in fighting the fire were found to have traces of radioactive contamination (thorium) on the filters. As a consequence, the Fire Department surgeon put several firemen on the sick list, hospitalized them, and ordered a complete blood examination, which obviously showed nothing. The fire chief still speaks of his "injured" men, and he recently complained of aches in his arms which he attributes to radiation exposure at the time of the fire which occurred a long time ago.

The persons involved in these particular incidents are not to be criticized individually for their reactions. Their behavior under the circumstances is in many areas considered standard practice. For example, it is not uncommon that as a transient visitor in a plant we have been required to carry film badges and put on smocks and shoe covers in areas where it was well known that the radiation level rarely, if ever, reached 1 mr/hr and concentrations of airborne contamination rarely, if ever, reached even instantaneously that value of concentration which is permissible 40 hours per week for life. In many such places, safety glasses and hard hats would have been much more appropriate.

The reaction of the press to such incidents is interesting. In the case of the explosion mentioned before this entire incident involved about 30-50 pounds of natural thorium. The hazard of this material is somewhat less than that of lead, and thorium has been processed for some 75 years in the manufacture of gas mantles without any reports of illness. Yet when the first papers hit the street, they carried headlines such as "Atom Blast Rocks Queens Plant."

Another similar incident was one that happened about 10 years ago. A custodial employee who worked at the Columbia University Pupin Physics Laboratory was walking down First Avenue near 46th Street. For some reason, which escapes me, he was shot—possibly as an innocent bystander. The papers headlined this as "Atom Worker Shot near U. N."

To return to the restrictive practices which are normal in the atomic industry, the operating complexities created by the use of such restrictions, together with the extreme care that is generally put into reducing effluent concentrations to 10^{-4} to 10^{-6} times what could be permissible, will undoubtedly postpone the day when radioactivity will be handled as the great boon to mankind which it eventually must be.

For many reasons, maximum permissible doses and concentrations have been very conservatively calculated. In administering these permissible levels, particularly in the case of short term or intermittent exposures, this degree of conservatism which has been built into the recommended levels should be kept in mind, with particular attention to the following facts:

1. Except for the values for radium and radon, each and every maximum permissible radiation dose rate or exposure is the result of labored calculations based on estimates of single acceptable radiation dose to tissue regardless of sensitivity. These estimates, in turn, have been derived from acute effects at doses many orders of magnitude higher. No single case of illness has ever been diagnosed as arising from doses anywhere near the levels which are specified.

2. Permissible dose rates or concentrations are for full-time exposure for an entire lifetime.

3. Maximum permissible radiation dose rates (in mr/hr) are meaningless unless the time of exposure of an individual is also considered.

4. The most recent reductions in dose rates (1946 and 1957) which have been emphasized by the press and others as being so meaningful have been made without any evidence of harmful effects at the previous maximum value. The life-shortening studies of radiologists are still far from conclusive, and these exposures to the radiologists were almost an order of magnitude above industrial radiation levels permitted under the old limits.

Just consider for a moment the application of the maximum permissible level for some material with which much greater human experience is available. Take, for example, the maximum permissible level for exposure to mercury, which carries a far smaller factor of safety (if any at all) than is normally built into the levels permitted radioactive materials. Yet, who would not feel completely safe permitting operation at *average* levels right up to the MPC without ever considering initiating restrictive action on single spot samples. By way of further comparison, let us examine

experience and efforts in other specific areas.

In December, 1952, there occurred a smog episode in London. Statistical examination revealed that this episode was accompanied by an immediate and sudden rise in illness and death. It has been estimated from the death rate statistics that about 4,000 persons died in a matter of three or four days as a direct result of this pollution occurrence. This was indeed a tragic experience, and steps have justly been taken to determine and correct the cause. By comparison, however, imagine if you can, the results in our present emotional atmosphere regarding radiation if the public were to learn that 4,000 persons had been merely exposed to, let us say 10 times the maximum permissible dose (or maximum permissible concentration) of radiation, even though we are certain that any somatic effects would be undetectable and the genetic effects on the population, if any, would be a matter of conjecture.

In another reference to air pollution we bring to mind the Congressional tussle which has been going on for some years regarding the provision of insurance for a potential reactor incident. A careful examination of the statistical possibility of such an incident puts it in the 10^{-6} to 10^{-9} category with a possible loss per incident of the order of a billion dollars. Compare this, for example, with the statement in the Beaver report[1] on air pollution published in London in which it is estimated that the annual cost of air pollution in Great Britain at this time is of the order of a quarter of a billion dollars each and every year. The annual cost in this country is significantly higher.

Now let us consider some of the legal implications. In the past few years there have been a number of law suits in which excerpts from the National Bureau of Standards Handbooks have been accepted as evidence of standard practice. This is as it should be, but this also imposes upon those writing such guides the grave responsibility of not distorting the degree of importance of the effect of radiations out of all proportion to the other hazards of modern-day living. For example, radiation exposure of any member of the general population is limited to 0.5 r per year. It is freely acknowledged that this is done particularly out of concern for the entire population rather than for the individual. It past experience is repeated, we will undoubtedly find that single exposures of over 0.5 r in a year will be considered overexposures, and most uninformed persons will be certain that any higher exposure will be damaging. This will be true in spite of the fact that no reasonably informed person believes that a dose of 0.5 r, or many, many times that amount, will have any detectable effect on an individual or have any significant genetic effect on the population, even should thousands more be so exposed. Such a rule will only pave the way for ignorant or unscrupulous individuals to file and possibly to win fradulent or spurious claims for damage.

It is the responsibility of guardians of the public health and safety to insist on realistic appraisal of radiation hazards. Whenever one is faced with a situation involving radiation or radioactivity, the following points should be borne in mind:

1. Virtually every common material is radioactive to a measurable extent. The presence of measurable radioactivity must therefore not be considered prima facie evidence of hazard.

2. The terms "radioactive" and "radioactive contamination," unless stated quantitatively, are meaningless and cannot be used synomously with radiation hazard.

3. Radioactivity must be stated in quantitative terms which may be referred to accepted standards.

4. In substantially all situations of possible radiation exposure, lethal or sublethal doses have an extremely low probability of occurrence. In such situations descriptions or radiation sickness, sterility, etc., are unnecessary and, in fact, can induce neurotic response which may be very harmful.

5. Any explanation of radiation hazard to uninformed persons should be made without resort to "fear techniques" but, rather, on a basis which brings the possible hazard from the greatest potential exposure into proper perspective.

6. Informed persons owe it to their fellow man and to the industry to be straightforward and factual in their description of potential hazard and in their imposition of adequate safeguards. This should be done in such a way as to provide safety without that extra added precaution which induces fear. The novice should leave such description and safeguarding to the more informed.

7. In the event of an unusual contaminating incident, public information media should be given a detailed description which provides a complete and straightforward presentation of the facts.

8. In many cases, radiation restrictions are imposed for reasons other than health. These might include the protection of film, the protection of analytical equipment, and even in some cases the psychological protection of the uninitiated. In any case, it should be made perfectly clear to everyone why the restriction is being imposed. We believe that if the

responsible protection agency in every case asks itself "Why is this restriction being imposed?" there will be more reason behind the restriction.

In closing, I should like to quote from a report[5] published by the World Health Organization entitled "Mental Health Aspects of the Peaceful Uses of Atomic Energy." This report was prepared by a competent committee of radiobiologists and psychiatrists. Among similar suggestions, the report states: "It is characteristic of atomic installations that their medical services have been extremely highly developed and that they have a remarkable record of safety. As in the case of isolation of plants, the possibility might be considered that a threshold may exist above which further emphasis on protection may begin to show a diminishing return. A considerable aura is attached to the 'man in white' who carries out personnel monitoring and so on. It is time to make investigations to find out whether there is a point reached in the development of safety regulations beyond which any addition to the regulations will tend to increase anxiety and therefore decrease efficiency."

(Mr. Harris' address is 26 Usonia Rd., Pleasantville, N. Y.)

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IV. THE OFFICE ENVIRONMENT—FACT OR FANCY

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AS A DESIGNER of office buildings and offices, I realize that the environments created therein affect many persons for a major portion of their waking hours. Light, heat, color, quiet, furnishing, decor, open spaces, private offices are some of the tangible problems that are fairly easy to resolve. A much greater difficulty confronting the office planner is the tremendous weight of superstition (note how few skyscrapers have a thirteenth floor), misconception, and downright subterfuge governing requests to him for space and treatment. In developing specifications for the occupants, the measure of his success depends upon his ability to winnow out the wheat from the chaff, the true from the false, the Fact from the Fancy, and to make his findings palatable and acceptable. It is not my intention to cover at this time the mechanical or technical details of office planning. Rather, I should like to examine some of its human aspects and, particularly, the effects of custom, tradition, and our modern economy on the office environment.

Let's take a quick look at the beginning of office planning. I probably stand alone in my belief that it even antedates what has been called "the oldest profession in the world." I trace it all the way back to prehistoric man, whose "big business" was keeping alive. Toward this end, he found that a cave made the best "office" from which to conduct these activities. Refinements in office planning entered the picture when he realized that the cave mouth was the best place to "file" the stones used to repel competitors in his "business" of growing old and that a dry ledge made a better work bench than the damp floor. When he learned that a western exposure was to be desired in the winter but not in the summer, air conditioning was born.

As civilization developed, man became more advanced in his methods of keeping enemies away from his "office." He moved it from the cave to the house on stilts, then into a stockade, and later to a walled castle with moats and drawbridges. Crude methods of production kept supply down so that his own needs usually demanded his entire output. It wasn't until a semblance of mass production came into being that competition and distribution problems arose. Because there was no need for "selling" and the main function of the "office" was still to keep alive, the moats and drawbridges were necessary to keep the public at a safe distance.

Unfortunately, this attitude is still reflected in many offices of today. Receptionists, secretaries, and even armed guards too often convey the attitude of defense instead of welcome. Long intricate corridors, passageways, anterooms, etc.—these are today's moats and drawbridges. Are these defenses a necessary adjunct to modern business? Are they status symbols

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or just throwbacks? Were they planned or simply repeated through inertia? All of this may appear to be inconsequential until we stop to realize that the visitor held at arm's length today is the same man toward whom we will be pointing tomorrow's multimillion dollar public relations compaign.

With this background let us examine the office environment of today and see to what extent it is affected by Fact or Fancy. Is it fact or fancy that "unless we give the boss the southeast corner he won't buy the plan?" Money spent on the furnishings and decoration required to give his area proper status in the eyes of important visitors will be wasted if the route from the reception room to that extremity of the building is devious, passing through long corridors and work areas that are necessarily less well appointed. The important visitor's time and patience would certainly both be taxed. He might well question the courtesy of a host who requires him to make a grand tour of the building in order to reach their meeting place. Callers at one's home would find it strange indeed if, after leaving the foyer, they were led through the dining room, the butler's pantry, the kitchen, the maid's room, and the basement, on the way to the living room.

"Too little space is a costly burden." This, of course, is Fact, but it is sheer fancy to believe that too much space will not be even more costly. Good communication is the single most important element in any organization. Unnecessary space hampers communication unless additional people and equipment are provided. Since excessive space adds to payroll costs in direct proportion to its excessiveness, it must be avoided.

"Concentration and decision-making require silence and isolation." Fact or Fancy? If this were entirely factual, no battles would be won, no laws enacted in Congress, no decisions reached by jurors, no problems solved in family kitchens, no airplanes flown or trains run, no fires put out or surgical operations performed, no newspapers published and, last and least, no school homework done in front of television sets.

"A minimal noise level is essential for efficient office work." This is certainly a popular concept but is it Fact or Fancy? I have been unable to find scientific data that completely substantiate this premise. Excessive noise is, of course, undesirable. We do know, however, that too low a noise level will result in total loss of sense of privacy. People will discuss important and even intimate matters freely over the luncheon table in a bustling, crowded restaurant, but will speak in hushed whispers when they are the only customers and the place is very quiet. It has always seemed somewhat incongruous that the same company that acoustically treats offices to lower the noise level will sometimes pipe in music to raise it.

"All this company needs is to move to the country—the suburbs—the city!" Separating Fact from Fancy here is a real problem. Each case requires a great deal of careful study, measurement, and evaluation. The result will probably disclose that none is necessarily Utopian. We have learned, however, that companies employing a large young female population whose replacements must come from the local high schools should hesitate to move from the city to the suburbs. These girls will completely discount all the trials and tribulations and costs of commuting to the glamorous City, which is filled with so many eligible young men, and where the shops and theaters are so convenient. Working in the city also means being "away from home," free at last from too much parental domination.

Next, we should touch upon the subject of the private office. (It would be hard to find a "touchier" subject.) There is no other area where the issue of Fact or Fancy becomes more clouded. It is often claimed that unless an office employee is completely enclosed by four soundproof, airtight, impenetrable, thick walls in an area labeled a "Private Office," he will be reduced to a quivering mass of human jelly, unable to generate enough concentration and thought to decide between ham and cheese for lunch, much less to do his work. Unless Lizzie Tish, the second assistant secretary to the fourth Vice President in charge of blowing the noon whistle, sits in the solitary splendor of an anteroom that would make King Tut's tomb look like a gymnasium locker, she will never be able to keep up with the coffee-break schedule. We have often seen how an otherwise reasonable man, an honest, considerate, and charitable man, who, we are sure, does not beat his wife every Saturday, will lie, connive, and cheat to beat his best friend in the race for confining walls. And after he gets these walls, he will get down on his knees, not in prayerful thanks, but to measure! If he finds that his area measures 14 square inches less than that assigned to his lifelong buddy, the dear friend to whom he gave a blood transfusion when his ulcer bled last year, he may blow a gasket. The "dear friend" will immediately be ostracized. There are cases on record where he even tried to get the blood back.

"I need a private office for seclusion, for exclusion, for collusion, for entertaining visi-

tors, to keep visitors out, because I like quiet, because I'm noisy, because I'm an introvert, because I'm an extrovert." Fact or Fancy? Only individual study of each case will decide. Unfortunately, in the meantime, management is sometimes stampeded into a frantic buying of wood and glass partitions, steel and glass walls, bank screens, glazed rails, and even silly little tables with windshields that afford about as much privacy as a dime-store showcase.

"More, bigger, and better fringe benefits are the answer to personnel problems and turnover." Fact or Fancy? I am of the opinion that excessive, illogical and inequitable fringe benefits cause more problems than they solve. A management that substitutes fringe benefits because it is unable or unwilling to accept its responsibilities as well as its prerogatives has abdicated.

"Let's give Willy a private office, a new company car, access to the private dining room, or a key to the executive washroom. He is a problem child and will sulk if we don't." This is the easy way. It verifies the old proverb, "The squeaky wheel gets the grease." But, is it good management? How about the other 99 "silent wheels," the nonproblem people who, being human, will smolder and become less productive when they are overlooked. They, too, deserve management's careful consideration.

"This builds the ego! That tears it down! This is good psychologically! That's bad psychology!" Fact or Fancy? One of our major problems in office planning is the multitude of half-baked, amateur would-be psychologists who expound with great authority what is often nothing more than an old wives' tale. Defending against their unfounded theories led a friend, a former Commissioner of Public Buildings for the General Services Administration (in effect the landlord for all the federal agencies), to list the following specifications for a successful office planner:

"The curiosity of a cat
The tenacity of a bulldog
The determination of a taxicab driver
The patience of a self-sacrificing wife
The diplomacy of a wayward husband
The enthusiasm of a jitterbug
The friendliness of a child
The good humor of an idiot
The simplicity of a jackass
The assurance of a college boy
The tireless energy of a collector of past-due bills."

I am sure that the whole world stood in awe of the courage of those submariners who sailed under the pole and circumnavigated the globe without surfacing. Yet, their job was easy compared to that of the office-planning project engineer who must face the bared fangs of the charging, maddened horde of the other 599 employees who *did not* get the four-window, southeast corner office.

So, my dear friends, if ever asked to plan an office, or to sit on a committee that will do it, *don't*—especially if you expect to go on working for that company and living in that community! Run for the nearest exit! Call the police! Get an expert! Get two experts! But don't do it, for experience has amply demonstrated that "Hell hath no fury like an office planned."

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THE FIRST INTERNATIONAL CONGRESS ON ERGONOMICS

will be held

August 20-23, 1961, in Stockholm, Sweden

The theme of the Congress will be "Adjustment of Work and Working Environment to Man." The program, which is planned for specialists in the different fields of ergonomics, will be devoted to the following subjects: Speed of Work and Ergonomics; Adjustment of Working Environment to the Aging Population; and Ergonomical Job Analysis (evaluation of work and working environment from the ergonomical point of view).

Further information may be obtained from the chairman of the Organizing Committee, Dr. Sven Forssman. Dr. Forssman's address is: Svenska Arbetsgivareforeningen, Postbox 16120, Stockholm 16, Sweden.

Topical Review

Chronic Carbon Disulfide Poisoning

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CARBON disulfide (CS_2), also called carbon bisulfide, is a colorless and highly combustible liquid. It ignites spontaneously at about 130° C., and so, for instance, contact with hot metal parts or electric bulbs may cause ignition of the vapor if its concentration in air is between 1.25% and 50% volume. Although the truly pure compound is supposed to be odorless, the industrial product, in spite of being 99.9% pure, has a strong and disagreeable odor. CS_2 is miscible with alcohol, ether, and benzene. It is highly volatile, the vapor pressure being 294.3 mm at 19.7° C. The density of the vapor is more than two and one-half (2.62) times that of air, a factor to be considered in respect to distribution and concentration.

Industrial Uses

CS_2 has been known for a very long time as a good solvent for oils, fats, waxes, rubber, and other materials. Other solvents, however, have replaced it in extraction processes. A large amount is still used in the manufacture of carbon tetrachloride. It is utilized in the cold vulcanization of rubber; in the production of rubber accelerators, resins, xanthates, thiocyanates, plywood adhesives, and flotation agents; and as a pesticide. In the United States, 73.2% of the total production of 280,000 short tons of CS_2 was required for the production of viscose rayon and cellophane in 1959.

History of Occupational CS_2 Poisoning

Toxic effects of CS_2 have been reported in Europe for more than a hundred years. Vigliani and Pernis[1] have divided the history of occupational CS_2 poisoning into three periods. According to these authors, the first period extends from 1856 to World War I and may be called the period of acute and subacute psychoses. These occurred among workers who, during the cold vulcanization of rubber, were exposed without precautions to extremely high concentrations of CS_2. The second period covers the time from World War I to the end of World War II, when polyneuritis was the predominant effect of long-extended exposure to lower concentrations in the viscose rayon industry. Another manifestation of chronic poisoning by CS_2, "carbon disulfide atherosclerosis," has been claimed by the authors as characteristic of the present, third, period. Many European publications deal with the last two periods. Toxic effects of CS_2 had been mentioned occasionally in the American literature, but not until 1938 was the subject studied systematically. In that year, Lewey and co-workers[2] published the "Survey of Carbon Disulphide and Hydrogen Sulphide Hazards in the Viscose Rayon Industry." At about the same time, Gordy and Trumper[3, 4] reported on a number of cases. Several years later, Rubin and colleagues[5, 6] described effects of chronic low-grade exposure. Since then, CS_2 poisoning has become a rare occupational disease in this country.[7, 8] Its incidence has greatly decreased also in England and France. In some other European countries, however, it occurred very often and in severe form during World War II and is still observed not infrequently. The difference between the low incidence in the United States and the high incidence in Europe is, in all probability, due to great differences in exposure.

Absorption, Metabolic Fate, Elimination, Mechanism of Action

The main route of absorption is inhalation of the vapor. Absorption through the intact skin is uncertain, although it has been reported in rabbits exposed to concentrations above 150 ppm.[9] Intestinal absorption is of no practical interest in industry.

It is fortunate that the knowledge of absorption, metabolic fate, and elimination of CS_2 is based on observations in man as well as in experimental animals. No less than 80% of

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the inhaled vapor is absorbed within the first quarter-hour.[10] When equilibrium is reached, an average of about 30% is retained.[11] The distribution of this body burden has been studied by injection experiments in animals. Strittmatter, Peters, and McKee,[12] using tagged CS_2^{35} in guinea pigs, found 20% to 50% of S^{35} in the body, especially in the liver, with the distribution becoming more uniform with time. Merlevede[11] showed that CS_2 is deposited in all tissues. Seven days after injection, traces could still be found in the liver, bile, kidneys, and adrenal glands. The brain of the animal takes up CS_2 slowly but retains it over an extended period of time; the same, though to a lesser degree, is true of the heart.[13, 14] Traces of CS_2 may be detected in the blood of workers several hours after exposure to the vapor, and even longer in the urine. CS_2 is eliminated from the body mainly through the lungs. Zahradník and Schmidt[15] have calculated a "triphasic" elimination as the resultant of three simultaneously occurring processes with different rates of velocity. Only 10% to 30%, however, is exhaled, and less than 1% is eliminated in the urine. It is generally agreed that, therefore, 70% to 90% remains subject to metabolization.[16]

McKee and co-workers[17] were the first to demonstrate metabolization in the form of increased urinary output of inorganic sulfates. This finding has been confirmed by other investigators. Merlevede[11] saw most of the CS_2 disappear when it was added to blood, cysteine, or glutathione; amino acids with sulfhydryl groups reacted with CS_2. Several authors have reported similar findings, showing very strong binding with albumin and strong binding with cysteine and chymotrypsinogen. Bobsien[18] saw definite interaction with euglobulin. This author believed that the free sulfhydryl groups are the site of binding. The comprehensive studies of the subject made over many years at the Institute of Industrial Hygiene and Occupational Diseases, in Prague, have been summarized by Soucek[16] and Zahradník:[19] CS_2 retained in the organism is metabolized by combining with materials that contain a free amine group or basic nitrogen atom which is suitably placed in the molecule. Reaction products of CS_2 with proteins contain an increased number of sulfhydryl groups and are of two types. The first type decomposes in an acid medium at raised temperature with the liberation of CS_2, while the second type is stable under these conditions. The fate in the organism of either type of reaction products is not yet known. Dithiocarbamates are the products of a reaction of CS_2 with amino acids, a finding confirmed by Yoshida.[20] The dithiocarbamates are partly excreted in the urine, partly transformed further at least in three ways: They are decomposed back to CS_2 and amino acids, they split off isothiocyanates, and they split off hydrogen sulfide, which is oxidized to sulfate ions. It is interesting to note that the dithiocarbamates, the most evident metabolic products of CS_2, interfere with the oxidation of acetaldehyde in the same way as tetraethylthiuram disulfide (Antabuse).[21] The toxic action of CS_2 on the protein metabolism has been confirmed by numerous authors, more recently by Granati and colleagues[22] and Piccoli and Rozera.[23] Several American authors have contributed to the understanding of the interaction of CS_2 with the NH_2 group of peptides and proteins. Cohen and associates[24] have reviewed this literature and, taking into account the results of their own experiments, arrived at the following conclusions: "(1) inhaled CS_2 dissolves in the blood serum and slowly reacts with free amino groups of proteins and amino acids; (2) the thiocarbamate and thiazolidone groups thus formed chelate metal ions and interfere with the energy metabolism of cells as well as preventing the use of amino acids; (3) the metabolic stress calls forth an adrenal response with mobilization of the fat stores in an attempt to maintain the body metabolism; (4) the cells most vulnerable to the metabolic disturbance fail in their normal function and ultimately die." The implications of the chelating action on tissue copper and zinc have been studied further by the same group;[25] the disturbance of the zinc metabolism has been investigated also by Liniecki and co-workers.[26]

According to Vigliani and Pernis,[1] CS_2 interferes with normal protein metabolism through inhibition of the clearing factor in the plasma. This disorder, Vigliani has stated repeatedly, leads to persistent presence of lipoproteinic macromolecules that penetrate into the arterial walls and produce hyalinization and sclerosis, i.e., "carbon disulfide atherosclerosis." Ruikka's[27] study, comparing postprandial serum turbidity in viscose workers and in unexposed groups, appears to support the concept that the clearing process is inhibited by CS_2.

The very complex nature of the action mechanism of CS_2 makes different approaches understandable and even necessary. Lewey and co-workers[28, 29] had strongly suggested that thiamine deficiency due to liver injury plays an etiologic role in the development of CS_2 neuropathy. Thiamine deficiency has not been established definitely.[30–32] Michalová and Frydl[33]

connect the psychotic disorders with hepatic dysfunction. Besides thiamine deficiency, Lewey considered poisoning of coenzymes active in nerve metabolism as a causative factor. DeMeio and Brieger[34] studied the effect of CS_2 on tissue respiration and glycolysis. There was an indication of an inhibitory effect on the in vitro oxygen consumption of brain, liver, and kidney slices, but no effect was observed in vivo. Anaerobic glycolysis of rat brain, kidney, and diaphragm decreased significantly in vitro when minute amounts of CS_2 were added. Soucek and co-workers[35, 36] have reported that brain tissue respiration and cytochrome oxidase are inhibited by CS_2 in vitro. According to Kimiya,[37] only low concentrations of CS_2 inhibit tissue respiration and anaerobic glycolysis in the rat brain. The activity of succinic dehydrogenase has been found unchanged.[38] Reports on cholinesterase are controversial. The findings of Cohen and associates[24] permit the conclusion that alkaline phosphatase is inhibited, probably because of the chelating effect of thiocarbamate and thiazolidone groups.

The literature dealing with the influence of CS_2 on proteolytic enzymes has been surveyed by Soucek and co-workers.[39] Brieger and Friedman[40] had found the activity of pepsin, trypsin, and pancreatic lipase unaltered. The later findings of Soucek and his group to the contrary, however, are rather convincing.

Experimental CS_2 Poisoning

Lewey[29] stated in 1941 that no systematic experimental study of chronic CS_2 poisoning had been made. In the experiments that he reported, dogs were exposed to approximately 400 ppm for 11 weeks, and the following observations were noted: marked behavioral changes; rigidity and tremor; choreatic movements, motor weakness, flaccid paralysis, and nerve tenderness. In addition, abnormal pupillary and corneal reflexes were in evidence, also retinal angiospasms and electrocardiographic changes. The pathologic findings were confined to the nervous system. Alpers and Lewey[41] described these as alterations in ganglion cells, arterioles, and peripheral nerves. The damage to the striatum was especially extensive. Injury to the Purkinje cells was probably responsible for the severe ataxia observed in the dogs. Most striking were the vascular changes, consisting of proliferation of the endothelium and thickening and hyalinization of the cortical arterioles. The spinal cord was not markedly affected. Peripheral nerves showed swelling and fragmentation of the myelin sheaths, with the axis-cylinders predominantly affected. A detailed histologic and biochemical study of the peripheral nerves and their membranes has been presented recently by Chiarugi.[42] It appears that, in small experimental animals, cell injuries and productive vascular changes are distributed over the entire brain,[43] whereas in the more highly differentiated brain of the monkey, the lesions have been found mainly in the basal ganglia.[44]

As mentioned before, the vascular changes already strongly emphasized by Lewey and coworkers have been given predominant importance recently. By exposing rats and guinea pigs eight hours daily for several months to 129 to 193 ppm, Pecchiai[45] succeeded in producing arteriolar and capillary alterations in the brain and in other organs; other investigators have achieved similar results. Guarino and Arciello[46] and others have described corresponding changes in the coronary arteries. Electrocardiographic changes, as mentioned by Lewey and other authors, have not been noted by Brieger[47] and Cohen and his co-workers.[24]

Special importance has been attributed to toxic hepatic injury. Some biochemical irregularities and autopsy findings suggested to Lewey[28, 29] dysfunction of the liver. Marked fatty degeneration and significant increase of blood cholesterol have been described in chronic poisoning of rabbits by injection.[33] As Cohen and his colleagues[24] have pointed out, however, the changes in cholesterol values may not be the result of a direct toxic effect of CS_2 but an indirect result of altered body metabolism. Various pathologic changes in the liver of exposed animals have been described by Nunziante Cesàro,[48] Mezzasalma and Cerbone,[49] and others.

The toxic effect of CS_2 on the kidneys has been studied most comprehensively by Isler.[50] Rats exposed intermittently for periods up to 12 months developed "glomerulonephrosis" and finally atherosclerotic processes. Rabbits exposed for more than 28 weeks to concentrations increasing from 150 to 750 ppm showed a high incidence of chronic interstitial nephritis.[24]

It has been stated in the older literature that anemia is a regular occurrence in experimental CS_2 poisoning. No significant blood changes were seen in the experiments performed by Lewey and co-workers.[29] Repeated exposure of rabbits to approximately 1,100 ppm had no effects on the peripheral blood cells or the bone marrow; prolonged exposure to approximately 300 ppm produced only pseudoeosinophilia and increase in granulopoietic activity of the bone marrow.[51, 52] In contrast to Brieger's findings, Paterni, Germini and Dotta[53] have described far more serious effects on the bone

marrow of rats following injections of large doses of CS_2; the changes reminded the authors of myeloblastic leukemia and other myelopathies, including those caused by benzene.

Vascular and degenerative changes in other organs have been described. Cortical hyperplasia and adenomata of the adrenal glands were prevalent in exposed rabbits, and the hyperactivity has been interpreted as another expression of metabolic stress.[24]

In evaluating the experimental data, it should be considered that, in general, the exposures have been very severe, especially if compared with the American Threshold Limit Value of 20 ppm. Many differences in the results may be explained by differences in experimental conditions.

CS_2 Poisoning in Man

The old literature, going back as far as 1851, stresses mental disease starting with symptoms and signs resembling those of acute alcoholic intoxication and progressing to depression, loss of memory, apathy, acute mania, delusions of persecution, and hallucinations. Recovery was noted in some cases, while in others permanent dementia developed.[54] Other toxic effects, especially polyneuritis, were observed and described early.[55] The workers afflicted had been exposed to CS_2 in the cold vulcanization of rubber, a process that was not used in this country as widely as in Europe. Exposure to high concentrations of CS_2 in the European viscose rayon industry increased the incidence of CS_2 poisoning considerably. Again, psychoses and polyneuritis were reported, the latter affecting the motor nerves more severely than the sensory nerves; in addition, gastrointestinal symptoms and anemia were frequently found.[56] Owing to the conditions created by World War II, many new cases occurred in Poland[57] and Italy.[1, 58] Within two years (1940-1941), no less than 100 cases due to exposures ranging from 64 to 483 ppm were observed in Piedmont.[58] The symptoms and signs corresponded, in general, to the previously described picture: polyneuritis (88%), headache and vertigo (18%), sexual weakness and tremors (16%), myopathic changes of the calf muscles (15%), mental deterioration (6%), and extrapyramidal signs (3%). Although in some severe cases there was recovery under prolonged treatment, in others the condition remained unchanged or even became worse. In 1938 and 1941, Lewey and co-workers[2, 28] published their findings in 120 workers employed in the American viscose rayon industry and expressed the opinion that the effects of excess absorption of CS_2 may involve all parts of the central and peripheral nervous system. Symptoms of mental disease were found to be accompanied in later stages by peripheral neuropathy, disease of the cranial nerves, and decrease of corneal and pupillary reflexes, as well as by pyramidal and extrapyramidal signs. Various degrees of Parkinsonism, and in three persons a true thalamic syndrome, were observed. One-fourth of the subjects examined showed cardiovascular anomalies. Especially striking was the large number of young persons with arterial hypertension. Alpers[2] has described the autopsy findings in a viscose rayon spinner with 21 years of exposure to CS_2. Corresponding to previous reports, extensive parenchymatous degeneration of the peripheral nerves (sciatic and intercostal nerves) and toxic disease of the nerve cells of the cortex were noted. Guided by their own findings and previously published reports on the pathologic changes in the nervous system, Alpers and Lewey[11] recognized only differences in degree between the findings in man and those in experimental animals, probably because of the difference in the type of exposure. The most striking change in both man and animal was vascular disease consisting of proliferation of the vascular endothelium and thickening and hyalinization of the cortical arterioles.

The dominance of vascular changes caused Attinger[59] to postulate that CS_2 is a vasotropic rather than a neurotropic poison, and, as mentioned above, atherosclerotic disease has been designated by Vigliani and Pernis[1, 60] as the form of chronic occupational CS_2 poisoning observed in Italy and Central Europe since the end of World War II. The majority of their patients, however, had been exposed previously to very high concentrations. The clinical and autopsy findings seen during the period from 1944 to 1954 were interpreted as typical of atherosclerotic encephalopathy in the majority of cases. Of the 57 patients studied by Vigliani and Pernis, 23 showed a pseudobulbar syndrome, 29 had hemiplegia, and 11 had extrapyramidal changes; in many of these cases, serious mental derangement was in evidence; 31 patients had arterial hypertension. The patients were relatively young and were exposed to hazardous concentrations of CS_2 over long periods of time; the incidence of atherosclerotic encephalopathy in a rather small group of workers was unusually high; the clinical and pathologic patterns differed from ordinary atherosclerosis.

Vigliani's statements have been disputed,[61, 62] but many Italian and Central European authors have supported him. Nunziante Cesàro and colleagues,[63, 64] have emphasized the importance

of examination for vascular changes in the eye, especially the measurement of retinal arterial pressure, for early detection of the disease. Nunziante Cesàro recommended that persons with retinal pressure of 100 to 120 mm should be temporarily removed from exposure, and those with over 120 mm should be permanently removed. Cati[65] and Balbo,[62] however, could not confirm the usefulness of ophthalmologic examinations. Major clinical findings on the heart have never been reported, but abnormal electrocardiographic readings have been frequently noted and have been attributed to atherosclerotic processes, for instance by Fusco,[66] Nesswetha,[67] and Ambrosio and coworkers.[68] Increase in blood pressure has been a rather general observation. Nunziante Cesàro[69] mentions increased fragility of cutaneous blood vessels.

Nephrosclerosis is, according to Attinger,[70] not the primary disorder but constitutes a part of the general atherosclerotic process. While renal involvement appears to be well established, the explanation of the functional and morphologic changes is somewhat controversial.[71, 72]

The "carbon disulfide atherosclerosis" has not been given the same attention in England or France, and pertinent reports have not been published in the American literature. Paterni[73] stressed the simultaneous occurrence of the classical, more "precocious" type of CS_2 poisoning described previously and the atherosclerotic type. He recommended chronaximetric and audiometric tests for early diagnosis. Chronaximetry enabled Klimková and associates[74] to differentiate between a peripheral and a central syndrome, but the analysis of the findings is difficult.[75] Electromyography may be successfully used in the detection of subclinical peripheral neuropathy.[76] Electroencephalographic examination reveals abnormal patterns of nonspecific nature.[77, 78] An interesting attempt has been made by Michalová and Horváth[79] to examine higher nervous activity by conditioned motor reflexes, with word reinforcement, association experiments, and electroencephalograms. Patients suffering from CS_2 poisoning presented a picture characterized primarily by an inhibitory inert syndrome, particularly in the motor area. Simultaneously, abnormally high levels of potassium were found. These and other changes in humoral factors are discussed by the authors in relation to toxic injury to the cortex-subcortex-suprarenal system.

Great importance has been attributed to toxic liver injury, as discussed in a preceding part of this paper. Lewey and co-workers[2, 28, 41] suspected impairment of the liver function, finding a significant increase of serum cholesterol, with simultaneous decrease of esters. Increase of cholesterol has been seen frequently but not regularly. In the latest study of the subject,[80] total cholesterol has been reported as subnormal in workers exposed to an average of 37 ppm of CS_2 for an average of 5.7 years. At any rate, it should be repeated that increase of serum cholesterol is not proof of a direct toxic effect of CS_2 on the liver. Saita and Gattoni[81] interpreted insufficient regeneration of prothrombin as an indication of liver injury, but liver function tests have, in general, not given uniform results.[82, 83] Microscopic examination of the liver has shown fatty degeneration and hemorrhages.

Gastrointestinal symptoms are frequently mentioned in the older literature, especially by Weise,[84] who found gastric or duodenal ulcers in 14 of 100 patients; in an additional 11 persons, ulcers were suspected. Twenty-five per cent of the workers examined by Lewey and associates,[2, 28] and 28% of those examined by Vigliani[58] had gastrointestinal complaints. In a recently published study of 42 severely exposed workers,[85] the incidence of chronic gastritis was 64%; acidity was low, and achlorhydria was frequent.

As in experimental animals, signs of hyperactivity of the adrenal glands (and of the hypophysis) have been described in man.[45]

Numerous older publications emphasize the occurrence of hypochromic anemia and morphologic changes of the erythrocytes. Maugeri,[86] in 1940, reported anemia in approximately 20% of Italian viscose workers examined by him; in contrast to Raneletti's[56] findings, the anemia was only moderate. At the same time, Creskoff,[2] in the study of 120 American viscose workers, observed the presence of "toxic monocytes" as the most consistent abnormality; the bone marrow was examined in two cases and found to be in good functioning order. Kiczak and Mroziński[87] compared the blood picture of 210 Polish viscose workers with that of office workers. These authors found hypochromic anemia and a shift of the polymorphonuclear cells to the left, depending in degree on the exposure; monocytosis was present in about 25% of all exposed workers, regardless of intensity and length of exposure. Paterni[88] has published a detailed hematologic analysis of three cases of CS_2 poisoning. He corroborated the previous reports on hypochromic anemia; other anomalies of the peripheral blood were rather insignificant and not uniform. The changes in the bone marrow were much less marked than those seen by the same author in

animals and consisted chiefly of retarded maturation of the erythrocytic cells.

According to Schwartz, Tulipan, and Birmingham,[89] CS_2 is the severest skin irritant among the organic solvents. Experiences in industry do not confirm this statement in respect to both the liquid material and the vapor. On the contrary, dermatitis due to contact with CS_2 has been conspicuously absent in the American viscose rayon industry.

The determination of CS_2 in blood or urine is useful only for the estimation of absorption due to a single exposure. Following moderate to severe exposure, mean values of 12.6 - 43.6 μg/100 ml have been found in the blood and, in general, somewhat lower concentrations in the urine.[90]

Treatment

Specific therapeutic suggestions have been made according to the interpretation of the action mechanism of CS_2 by the individual authors. Lewey,[28] emphasizing the importance of liver injury, recommended a diet low in fat, and, to counteract thiamine deficiency, the use of vitamin B. Merlevede[11] favored vitamins B and C, adrenocortical hormones, sex hormones, strychnine, preparations of calcium, and a diet rich in proteins. With chronic CS_2 poisoning defined as a vascular disease, corresponding treatment has been advocated. For instance, Nunziante Cesàro[69] has given consideration to cerebral vasodilators and sympatholytic drugs. Merlevede's statement, however, that treatment is mostly symptomatic is still true.

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Industrial Medical Association

THE PRESIDENT'S MESSAGE

GRADIE R. ROWNTREE, M.D.

THE ANNUAL meeting of the Industrial Medical Association held this year in Los Angeles, Calif., was one of the most successful meetings of the Association. This opinion was expressed by many of those present. Credit for the success of this meeting should go to the Program Committee, the local Arrangements Committee, and to those who worked long and faithfully to coordinate the numerous details.

Attendance at this meeting, the first held by the Industrial Medical Association and American Association of Industrial Nurses alone, exceeded our expectations. Total registration was 1,529, with 669 physicians registering. This is 4 fewer than the 673 physicians who registered last year in Rochester.

All registrants who desired accommodations were housed in one hotel. This arrangement was most convenient. With the meeting rooms and the exhibits so easily accessible, it made for better attendance at both.

To Ed Zaik and Clarence Lloyd, we owe a debt of gratitude for a very fine conference. They carried the responsibility for all phases of the meeting, and they are to be congratulated for putting on a conference which received high praise from many quarters.

The scientific program, with its innovation of refresher courses arranged by Jean Felton and his committee, was one of the best we have ever had. We heard many favorable comments on this excellent program. If attendance is a criterion, the refresher courses were a real attraction. It was planned that participation in the intensive refresher courses would be limited to 40 persons for each course, but admission was requested by many more physicians than it was anticipated.

The scientific exhibits arranged by Homer Elmquist were excellent. As for the technical exhibits, Bill Burns deserves high praise for selling every foot of available space. Both the scientific and the technical exhibits were set up in the Rex Room, just below the Biltmore Bowl, where many of the meetings were held, making the visits to exhibits very convenient.

This year the banquet had an entirely new look. Held in the Biltmore Bowl, it was a dinner dance with no speeches and no speakers' table. The orchestra was superb. The entertainers, a comedian and a singer, are rated among the best in Hollywood. This delightful evening, arranged by Richard Call and his committee, was enjoyed by everyone present.

The Public Relations Committee, with Tom Rigney as chairman, did a good job on publicity. Birchard Brundage, chairman of the Arrangements Committee, should be highly commended for a job well done. We owe thanks to Henry Morgan for his work on the Hospitality Committee.

I understand Mrs. Dillon kept the ladies happy and busy every day. She provided information on shopping and eating places and arranged tours which were well attended by the ladies. Mrs. Rothrock planned a fine luncheon with prizes and entertainment for the wives. Our thanks go to these two and all the ladies who were hostesses.

Clark Bridges and Rita Packer and the staff in the IMA home office are to be congratulated for planning and carrying out the many details necessary for such a fine, smooth running meeting.

At the annual business meeting, 58 fellowships were awarded. This is one less than the number awarded last year.

Our next annual meeting will be held in Chicago, April 10-12, 1962. The annual meeting of our Association provides an opportunity for the interchange of ideas and for fellowship with our colleagues.

Let's plan to make it as successful as this year's was in Los Angeles.

Book Reviews

AGING IN TODAY'S SOCIETY. Edited by Clark Tibbitts and Wilma Donahue, with the assistance of John Walker Powell. Price, $6.00. Pp. 418, with illustrations. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1960.

By N. J. ROBERTS, M.D.

Some years ago, H. L. Mencken indicated his conviction that the average man never really thinks from the beginning to the end of his life. He felt that the mental activity of most people consisted only of the mouthing of clichés, and that what we mistake for thought is simply a repetition of what we have heard. He estimated that over 80% of the human race goes through life without ever having a single original thought.

The editors of this book recall to our attention Mr. Mencken's stunning observation, and then proceed to make it very difficult for the readers of their book *not* to think.

Drs. Tibbitts, Donahue, and Powell are joined by six others in the presentation of 10 thoughtful essays on the middle and later years of life, and on some aspects of retirement. These essays are supplemented by selected reading matter which is chosen from roughly five dozen sources, and which ranges widely in age and style.

The book is an expansion and revision of two earlier volumes entitled "Aging in the Modern World," published as part of the effort of the Fund for Adult Education to stimulate wider study and discussion of major issues in American life. The work was used extensively for this purpose, and as a happy result the reader receives several worthwhile dividends.

First of all, at least some of the polish of the finished product is probably attributable to improvements stimulated by this previous use. Secondly, each essay except the last is followed by a group of provocative questions or statements designed to stimulate reflection on the subjects under consideration. Thirdly, the recommended suggestions for further reading and the appended list of useful books and articles are superior. Responsible discrimination has limited their number, and each is described briefly. Lastly, as a further dividend, audiovisual materials developed especially for use with the book can be obtained.

All in all, the volume is of the high caliber that we have come to expect of the editors on the basis of their past work independently and cooperatively. It is brimful of wisdom. Although inevitably the essays and readings vary in the extent to which they contribute, are pertinent, are of interest, and are unfamiliar, they range from a minimum of merely good to a maximum of superb.

The important differences between the first and second halves of life are lucidly and persuasively presented. Much good advice on adaptation to aging is included, considerable meaningful guidance on the use of leisure time is offered, and the reader is treated to an attractive perspective on culture. Education beyond childhood gets a good deal of attention, and throughout all the reader is spared exposure to extensive bare statistics.

The book is erudite, but the reader need not be. Whether he is or not, he will find in it enough of interest to keep him reading it like a novel, enough to make him talk to others about it, and, unless he's uniquely unresponsive, enough to assure the achievement of the editors' frankly announced goal of getting him to talk to himself. In fact, unless he is overawed by Mr. Mencken's searing cynicism on the subject, the reader will probably find himself disturbed into thinking. If he's not uncommonly stubborn or perfect, he should end up a better and wiser person, and should be better able to help himself and others to happier and healthier middle and later years.

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MODERN OCCUPATIONAL MEDICINE. Edited by A. J. Flemming, M.Sc., M.D., F.A.C.P.; C. A. D'Alonzo, M.D., F.A.C.P.; and J. A. Zapp, Ph.D. Ed. 2. Price $12.00. Pp. 587. Lea & Febiger, 600 S. Washington Sq., Philadelphia 6, Pa., 1960.

By WILLIAM F. ASHE, M.D.

Objectively to review a book when one knows and respects the authors is difficult.

The second edition of "Modern Occupational Medicine" is many things. Perhaps with the sole exception of the chapter of Occupational Chest Diseases, it is a medical manual for all medicos working full or part time for the E. I. duPont deNemours & Co. It will be equally useful for like purpose in any chemical industry. It will be of more limited use to those engaged only in the fabrication of things from preformed basic ingredients.

It has served as a medium by which the experienced experts at duPont could clarify their own thinking by writing chapters which, on the one hand, describe their concepts of their jobs and, on the other, delve into the why and wherefore. A few of the contributors, particularly Lucien Brouha, have used it as yet another excuse to push their pet projects, sometimes unwisely. Oversimplification does not help development in medicine.

This book is, probably not entirely consciously, a description of the maturation which has taken place in occupational medicine not only at duPont's but elsewhere in the United States since 1915. The chapter by a legal *colleague* (not opponent), three chapters on the psychiatric aspects of occupational medicine, and one on the alcoholic employee bear witness to this fact.

Few men could so succinctly make sense out of modern industrial toxicology as has Alan Flemming

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in the chapter Chemical Health Hazards. Likewise, it always gives us a thrill to see a basic scientist encompass fields other than his own and master them as has Dr. Zapp. The inclusion of Pell's chapter on biostatistics is highly desirable, but we wish he had also gone into the basic principles and basic techniques of the use of machine records systems to make plant medical data studiable.

Having made a very real contribution to occupational medicine, the duPont M.D.'s are now turning to America's best laboratories for the study of human degenerative diseases, *its factories*, not its hospitals. They are trying to understand coronary disease, high blood pressure, and cancer. This, too, is evidence of maturity.

But, should all this, and more, too, be in one book? If so, shouldn't there have been a single coordinating editor and rewrite man to give greater consistency of approach, less repetition, and to get rid of conflicts? Also, we wonder who teaches English at duPont. It seems to us more difficult to split one's infinitives flagrantly than systematically to avoid this error.

All students of occupational medicine will want to read this book. We shall use it in our teaching programs. Those who only work in industry should, but probably won't, read it.

Letters

TO THE EDITOR: One measure of the effectiveness of an editorial is found in the reflections created in its readers. Under the title "Maybe Grandpa Too," your February, 1961, issue editorially notes certain cycles of medical opinion and philosophy which have returned to the point of origin and found that there were stubborn realists who had never abandoned the original concept.

This brings to mind certain observations of my mother-in-law, who died at the age of 96 years:

> When, with feigned petulance, I presented a bill of particulars on the shortcomings and peccadillos of her daughter, which had become apparent to me after our marriage, the lady, then an octogenarian, listened quietly, smiled, and said, "Yes, I know, but what's wrong with her?"
>
> On another occasion, my mother-in-law noted sagaciously, "The older we are, the more like ourselves we become." *(Nicht wahr?)*
>
> My own status under her perceptive interpretation of what she had seen and heard during a long life was pinpointed by this observation: "The trouble with doctors is that they know so many things that aren't so!"

Nevertheless, no medication to check diarrhea was so satisfactory to the dear lady as that which I had prescribed for her once upon a hyperperistaltic occasion. For a score of years thereafter, and despite our separation by half the continent, she sent periodic requests for "that good medicine." A fellow can be lucky in the selection of a brilliant mother-in-law. So, Mr. Editor, "Maybe Grandma Too!"

—LEMUEL C. MCGEE, M.D.

Questions

The questions published in this column are edited versions of requests for information that have been received during recent months. The answers have been prepared by one or more competent authorities in the particular area covered by the question. Readers may address questions to the Editor.

QUESTION: *What is the present thinking in the treatment of subdeltoid bursitis and supraspinatus tendinitis? What kind of work restrictions should be placed on persons with these conditions?*

ANSWER: The term subdeltoid bursitis is a somewhat vague term frequently used to describe many painful conditions of the shoulder. Subdeltoid bursitis per se is usually a phenomenon secondary to some other underlying process in and about the musculotendinous cuff of the shoulder joint. Such rotator cuff pathology may be tendinitis with or without calcification, or bicipital tendinitis. Such underlying conditions may become associated with an acute, subacute, or chronic bursitis, which, with thickening and adhesion of its synovial lining, may lead to restriction of motion known as "frozen shoulder."

Other than for alleviation of pain, the prevention of "frozen shoulder" is the most urgent element in the treatment of these conditions.

Most patients with tendinitis do well with Hydrocortone injections into the bursal region and points of local tenderness. Such injections alleviate pain and permit important early active exercise of the shoulder. It is most important that patients be shown the routine of shoulder exercise so that it can be practiced many times a day. In the case of "frozen shoulder" this is of vital importance.

In those situations in which there is calcific deposition in a degenerative area of the rotator cuff with acute symptoms, again injection of Hydrocortone may resolve the symptomatic process and permit early exercise and restoration of function.

Where there have been chronic symptoms of a recurrent nature prior to the acute episode, and particularly where the calcific deposit as demonstrated by roentgenography is large and dense indicating a "dry" deposit, excision under local anesthesia, frequently with excision of the coracoacromial ligament and of thickened bursal tissue, followed by early restoration of function, is met with excellent recovery.

These conditions are on a degenerative basis. Trauma may be implicated, but it is no more than an aggravating factor. The cases of acute calcific tendinitis with bursitis actually are self-limiting. If motion can be maintained they will recover without treatment, though the above treatment will greatly shorten the course of the disease. Excision of calcium has the best opportunity of preventing recurrence. Work restrictions need be no greater than that amount of work which produces a degree of symptomatology which cannot be tolerated by the patient. Patients should be permitted to do as much physical work as they can; the limiting factor should be their tolerance of pain.

Editorial

Costly Longevity of Occupational Disease Disability

IN THESE times of broad social insurance coverage, most of the disputatious talk stemming from employers is concerned with the tax increase needed to meet the new costs. Joining in this cacophony against the welfare state is the voice of the worker who expects greater paycheck deductions.

Both the industrialist and the employee are guilty of contributing to the needs for greater social security. This is given testimony by data produced by the Social Security Administration from certain aspects of its disability programs. To take a pair of years, 1957 and 1958, it is noted that in the first of these 165,003 persons were allowed a period of disability.* This implies either the payment of monthly benefits (begun in July, 1957) or, under the disability freeze provision, the "freezing" of the social security records of disabled workers to protect their own and their families' rights to future benefits. To qualify under these provisions, one must meet a work test but, in addition, "must be unable to engage in any substantial gainful employment by reason of medically determinable physical or mental impairment that can be expected to be of long-continued and indefinite duration or to result in death."

Of those qualifying in 1957, 1.8%, or 2,970 persons,† were declared disabled primarily on the basis of "Pneumoconiosis due to silica and silicates (occupational)," a diagnosis delineated by the "International and Statistical Classification of Disease, Injuries and Causes of Death." The following year, 1958, saw 1.1% of the worker disability allowances, or about 2,029, granted similarly. In two years, then, 5,000 workers were added to the rolls of recipients for disability which accrued to them because of work hazardous to their health. The monies paid to them come out of contributions to the Fund made jointly by the employer and the worker, in accordance with a currently established percentage.

The total annual benefits paid would approximate $5,400,000, recognizing the variables in such an estimate. The point at issue is this: The cost of occupational disease does not cease with the payment of a lump sum in settlement or of a predetermined number of weeks of money in compensation. The cost appears not only in company-sponsored insurance benefit payments, but again, in the benefits accruing through the federal disability insurance plan. If the claims for disability—in this instance, job-connected disability—increase, the premium costs could rise in the future, as they would have to in any program of insurance, unless application of a spread-the-risk factor would maintain rates at their present level.

The additional expense of these payments, though, is preventable by good occupational health practices. The employer who fails to protect his workers through control systems in potentially hazardous exposure situations is leading to an increment to his federal insurance premium and also to state-sponsored and private insurance plan premiums. Similarly, the employee who fails to utilize the protective devices is increasing his own payroll deductions in the future, as well as risking unnecessarily his own health.

In essence, these paragraphs seek the realization that the cost of disability from occupationally incurred disease lives on beyond the day of settlement within the state's area of jurisdiction. Preventive measures provided by the employer and utilized by the employee can prevent profit and wage losses. Of the almost 200,000 disability allowances annually, 2,500 can be avoided completely; and this figure does not include the vast number of cases of disability resulting from work-incurred injuries.

—Guest editorial by
JEAN SPENCER FELTON, M.D.

*Annual Statistical Supplements, 1957 and 1958, of the *Social Security Bulletin*.

†These figures are distorted, in part, by the backlog of claims filed with early onsets during the first few years of the program. Because of incomplete reporting of occupational diseases in all jurisdictions, a comparison of prevalence is not possible.

Abstracts of Current Literature

Experimental Toxicology

Toxicity of Small Quantities of Cadmium and Chromium in Drinking Water Administered to Dogs During a 4-Year Period. R. U. Byerrum, R. A. Anwar, and C. A. Hoppert. J. Am. Water Works A. 52:651 (May) 1960. Pub. Health Eng. Abstr. 40:30 (Dec.) 1960.

Administration of 0.5, 2.5, 5, and 10 ppm Cd in drinking water to dogs caused no abnormalities in physical condition, growth, or food or water intake during the four-year test period. The accumulation of Cd in liver and kidneys, however, was proportional to that in the water when the concentration was 5 ppm or less and was equivalent to the amount found at 5 ppm when 10 ppm was administered. Isolation of a Cd-protein fraction from liver after a single nontoxic dose of Cd^{115} suggested a loose binding of the metal to a liver protein fraction. This binding may play a part in Cd detoxication in liver and kidneys. Administration of 1, 5, 10, and 25 ppm chromate ion in drinking water to dogs also for four years caused neither observable abnormalities nor symptoms, but accumulation of Cr in liver was found. —R.E.E.

The Use of Dimercaprol (BAL) in the Treatment of Cadmium Oxide Fume Poisoning. H. N. MacFarland.* Arch. Environ. Health 1:487 (Dec.) 1960. (*University of Toronto, Canada)

In a statistically designed set of experiments, nearly complete protection against the lethal effect of cadmium oxide fume inhalation in 200 gm rats was obtained by the daily subcutaneous administration of approximately 100 mg of dimercaprol (BAL) in divided doses after exposure to the fume.

Neither the amount of dimercaprol per injection nor the frequency of injections per day was a significant factor in the over-all protection effect; an increase in protection was obtained with increasing daily doses up to a maximum of 100 mg, beyond which a rapid decline in survivors occurred. The $L(Ct)_{50}$ and $L(Ct)_{95}$ values for a single 15-minute exposure to arc-produced cadmium oxide fumes were 666 and 1,088 mg min./cu m, respectively. It is concluded that reconsideration of the clinical use of dimercaprol in cadmium oxide fume intoxication is warranted. —R.E.E.

Study of Methods for Abbreviating Carcinogenicity Bioassays: I. Enhancement of Neoplastic Response by Pretreating with a Potent Carcinogen. W. E. Poel.* J. Nat. Cancer Inst. 25:1265 (Dec.) 1960. (*University of Pittsburgh, Pa.)

Limited pretreatment of the skin with benzpyrene in toluene, followed by chronic application of less potent "test" carcinogenic solutions, reduced the time to tumor appearance and augmented the incidence of tumor-bearing animals obtained with either procedure alone. These data suggest the feasibility of summating the effects of calibrated exposures to a potent carcinogen with that of subsequently applied materials of unknown potency as a technique for detecting weak carcinogenic activity or reducing the time for carcinogenicity assays. Creosote oil and coal tar acids were used as the test carcinogens as well as weak solutions of benzpyrene in toluene. —R.E.E.

Effect of Environmental Temperature and Humidity on Lead Poisoning in Animals. A. M. Baetjer,* S. N. D. Joardar, and W. A. McQuary. Arch. Environ. Health 1:463 (Dec.) 1960. (*The Johns Hopkins University, Baltimore, Md.)

At 95°F and low or high humidity, mice injected intraperitoneally or intravenously with lead died sooner and had higher mortalities and shorter survival times than mice similarly treated at 72°F. The effect was more marked when the heat exposure immediately followed the injection than when it also preceded the injection. Prolonged heat exposure prior to injection did not reduce the effect, but removal from heat at night did alleviate it to some extent. Mortality in rats was also increased following intravenous injection of lead. At 60°F, mice injected intraperitoneally with lead had a higher mortality and longer survival time than those at 72°F, but no difference occurred with intravenous injections. Chronically poisoned mice died sooner and had a higher mortality when exposed to heat after injections were stopped. Induced dehydration increased mortality from acute lead poisoning at all temperatures especially via the intraperitoneal route.

An increased basal metabolism induced by thyroxine increased female mice susceptibility to lead, similar to that induced by heat, but did not affect males. Weight loss and decreased activity induced by food restriction and isolation did not increase susceptibility to lead. Rats excreted less lead when exposed to high temperatures than at normal or low temperatures. —R.E.E.

The Toxicity of Allylamines. C. H. Hine,* J. Kodama, R. J. Guzman, and G. S. Loquvam. Arch. Environ. Health 1:343 (Oct.) 1960. (*University of California, San Francisco.)

Monoallyl amine was moderately toxic by single-exposure ingestion and inhalation and highly toxic on single exposure percutaneously. Diallyl amine was only slightly toxic by all three routes. Triallyl amine was slightly toxic on ingestion and by the percutaneous route and moderately toxic by inhalation. As a comparison, n-propyl amine was far less toxic on inhalation than the allylamines. Monoallyl and diallyl amines were severely to ex-

tremely irritant to the skin, while triallyl amine was only mildly irritant. On chronic inhalation, monoallyl amine caused death at 40 ppm, retarded growth at 10 ppm, and increased liver/body weight ratio even at 5 ppm. These changes were not significant with the other two allylamines until 200 ppm was reached, although increased liver/body weight ratios occurred at lower levels. The outstanding pathologic effect was myocarditis, seen with all three substances. Chemical pneumonia and some liver damage were also seen. All three allylamines are discernible by odor at 1-5 ppm, and sensory efferts are unpleasant enough to make voluntary overexposure unlikely. Comparative toxicity of related aliphatic amines is summarized from the literature. —R.E.E.

Mental Health

The Former Mental Patient: An Untapped Labor Source? J. E. Teplow* and R. J. Margolin. Personnel 38:17 (Jan.-Feb.) 1961. (*Ward Machine Co., Inc., Brockton, Mass.)

Rehabilitation of the mental patient has lagged behind the employment of the physically handicapped. With progress in treating mental illness, an attempt should be made to provide the atmosphere in society and industry to enable the former patient to function again as a useful member of society. This requires a contribution on the part of the mental hospitals and of the psychiatric facilities of the community. The hospital must not assume that because a patient is ready for discharge he is automatically ready for employment. There are stresses on the job which require that the patient undergo preparation by a work rehabilitation program which simulates normal working conditions. This is a sound observation, but one must note that there are not many rehabilitation programs designed to do this. Industry might also be expected to make a contribution—by offering the former mental patient his job again and also by attempting to create an atmosphere of sympathetic recognition on the part of the employer to assist the employee in his readjustment. "Making industry a partner in their therapeutic plan thus increases the likelihood of a successful work adjustment."

The authors describe in some detail a "number-employee program" of the Brockton Veterans Administration hospital at Brockton, Mass. Some widespread misconceptions concerning industry's attitude toward rehiring former mental patients are listed; for example, they include "I don't want my shop full of nuts"; "Mental patients are offensive, unstable, assaultive, and not responsible for their actions;" "I'm willing to hire a mental patient, but I'm afraid of the reaction of other employees;" "Once a mental patient, always a mental patient—he can never be an effective worker again;" "Mental patients are good only for unskilled jobs;" or, as some say "Mental patients can't take pressure or accept responsibility," or "This isn't my problem, leave it to the doctors." Each of these misconceptions is dealt with, and facts are given to contradict the stereotypes.

In summary, psychiatric patients can be returned to work more succesfully if the hospitals establish a work rehabilitation attitude toward the psychiatric patient. —G.C.T.

New Horizons in Psychiatric Hospitalization. L. H. Smith.* J.A.M.A. 174:1382 (Nov. 12) 1960. (*Institute of the Pennsylvania Hospital, Philadelphia, Pa.)

Recent developments in psychiatry—the antidepressants and tranquilizers—are well known. Not so well appreciated, however, is the significant change which has taken place in the concepts concerning psychiatric patient care. The mental hospital is becoming less isolated. This calls for a much closer cooperation between the general practitioners and the psychiatrists in the care of the mentally ill. Hospitalization in a mental institution is increasingly being considered to be simply one phase in the treatment of the patient. If we think in terms of continuity of patient care, there is treatment of the emotionally ill person within the community which may demand a period of hospitalization. Following is a period of rehabilitation and continuing psychiatric care after discharge from the hospital. Thus, psychiatric hospitalization is one phase of a continuous process of treatment.

Stemming from this, there are certain changes which need to be made in the mental health services in the community. The author outlines them as follows:

(1) The psychiatric hospital should have staff relationships similar to those of the general hospital; (2) there should be psychiatric sections in general hospitals; (3) the mental hospital should be smaller than it is at present and should be, if possible, located near a medical center and near community treatment facilities; and (4) an open door policy should be utilized "in every sense of the word for patients, doctors, and all concerned; in fact, it should be a swinging or revolving-door policy." —G.C.T.

Problem Workers—Or Workers with Problems? S. B. Kutash.* Supervisory Management 6:2 (Feb.) 1961. (*New Brunswick, N. J.)

This article, by a psychologist, is directed at supervisors to give them a practical guide in helping workers with emotional problems. According to the Joint Commission on Illness and Health, almost one in five American adults has felt close to a nervous breakdown and at least half of the two million persons who are absent from work on an average day are suffering from some form of emotional distress. Almost everybody in industry at times suffers from some sort of emotional upset which interferes with work performance. The supervisor must look for reasonable explanations

first, to realize that some problems may be temporary; nevertheless, problems may be based on deep-rooted disturbances. The supervisor is urged to change job conditions by making changes within the job or by transfer and, equally important, to attempt to bring about a change in the employee by talking with him and when necessary referring him for professional help. Advice is given on listening and also on referral. —G.C.T.

Surgery

The Finger Tip Injury—an Assessment of Management. G. S. Brody,* A. McL. Cloutier, and F. M. Woolhouse. Plast. & Reconstruc. Surg. 26:80 (July) 1960. (*Georgetown University Hospital, Washington 7, D.C.)

The objective of repair is to provide, without loss of length, a durable padded covering and a pain-free mobile digit with maximum of sensory function in the shortest time possible. One hundred ninety-eight cases over an eight-year period are reviewed. The pros and cons of primary closure, free graft, pedicle graft, and specially devised procedures are discussed. Reference to workmen's compensation and time loss of the different methods is made.

Final review realizes that tactilegnosis (sensory function) does not return to skin grafts and that any grafting technique for fingertip injuries results in a blind tip, which is a considerable disability. Split-thickness grafts are the treatment of choice in most tip injuries, since the procedure is simple, requiring one operation; the tendency of the graft to shrink draws normally tactile skin over most of the defect. It has been shown split grafts will grow on cortical bone; however, the bone should be trimmed flush or shorter than the soft tissue so that the latter may be drawn over with shrinkage of the graft and provide padding. There is a percentage of graft failure. Despite this, areas were epithelized and serviceable in four to six weeks, the grafts serving as a physiological dressing.

Simple grafting compares favorably with all other procedures where primary repair cannot be accomplished in respect to durability, rapid return to work, conservation of digit length, residual joint stiffness, and persistant painful areas. Tender hyperesthetic tips in most cases result from the nature of the injury, not the treatment. —S.S.

Trauma to the Trachea and Bronchus. E. D. Gagnon.* Mod. Med., (Feb. 6), 1961, p. 89. (*University of Montreal, Montreal, Canada)

Etiological factors producing sudden thoracic compression and injury to the trachea or bronchus may be a fall from a height, a glancing blow to the chest by a heavy object, or, most commonly, the steering column deceleration injury sustained in automobile accidents.

The mechanism of injury is postulated to be a shearing force; the injury has also been attributed to increased intraluminal pressure in the tracheobronchial system against the opposition of a closed glottis. The author classifies these injuries as complete ruptures or partial tears and further classifies them according to location and extent of the damage, mediastinal or intrapleural.

Suspicion of such an injury following trauma and a varied symptomatology dependent on the site and degree of the lesion will initiate adequate diagnostic procedures and prompt immediate therapy. Diagnosis is based on (1) hemoptysis after a blow to the chest, (2) physical and roentgenographic findings, and (3) bronchoscopic visualization of the tear. The presence or absence of subcutaneous emphysema, pneumothorax, with or without tension or interlobar emphysema, will aid in localization. The author diagramatically presents the symptomatology of a specific lesion and outlines treatment.

The urgency of bronchoscopic examination in these injuries is stressed. There are no contraindications, and prompt recognition of complete rupture or partial tear precludes proper management which may be lifesaving or avert serious lung complications. —R.V.T.

Medical Care Administration

Occupational Health: A World Perspective. M. B. Folsom.* Indust. Med. & Surg. 29:504 (Nov.) 1960. (*Eastman Kodak Company, Rochester, N. Y.)

Industrial health and occupational medicine had its major impetus in the passage of the first law on workmen's compensation in England in 1883 and the organization of the factory inspectorate to enforce it. Accident prevention practices, improvement in general hygiene, enactment of protective legislation, and organization of factory inspectorates spread to most industrialized countries. Regard for the total health of the worker has gained momentum in the more heavily industrialized countries during the past 25 years. The importance of total health maintenance is reflected in the fact that 90% of the 600,000,000 days of sickness absenteeism in the United States is due to nonoccupational illness. Accumulated knowledge in accident prevention, occupational disease, and total health maintenance have led to new concepts and refinements.

There are a host of new and exciting challenges as well as unresolved problems that must be solved in chemical hazards, radiation hazards, and agricultural hazards. Much needs to be done in research in lung diseases and the occupational aspects of chronic disease.

An equally difficult problem is the application of our present knowledge to the preventive aspects of occupational health as they apply to total health maintenance. Less than 5% of the workers throughout the world benefit from any type of preventive program. Many countries are developing programs aimed at the social and economic

rehabilitation of their handicapped, but the rehabilitation of the chronic, degenerative, and other diseases has been relatively neglected.

Since occupational health transcends all boundaries, an international approach represents one of the most promising means for the solution of our various occupational health problems. The massive success in international health cooperation could well serve as a model for other efforts to build a cooperative world characterized by peace, freedom, and justice. —A.B.

Let the Critics Help Make the Decisions. E. C. Bamberger Jr.* Hospitals 34:45 (Oct.) 1960. (*Piper and Marbury, Baltimore, Md.)

The interest of the public in hospital costs lacks leadership, purpose, and discipline. This interest has been produced by the growth of plans for prepayment of hospital expenses. Approximately one-half of the population are now paying hospital expenses; only a few are hospital patients. Those that are patients are the only ones who have a chance to evaluate service.

Prepayment plans were conceived and nurtured by hospitals, and hospitals still create the policy. The public now has a larger voice in the management of the plans, but the physicians and hospitals retain essential control. Physicians and hospitals cognizant of the great value of the plans must forsake some privilege and prerogatives to preserve public confidence in the plans and hospitals.

If hospitals continue to be exposed to investigations by government, we may have statutes enacted to subject hospitals to inquiry and supervision that prevail in the field of public utilities. Hospitals should consider how they can better educate, lead and discipline the public, and involve the public in making some of the decisions it now criticizes. Prepayment plans should assume a more critical aggressive attitude in representing subscribers in relationships with hospitals and physicians. It is suggested that a small committee be formed composed of representatives of the hospitals, physicians, prepayment plans, and state government to be charged with submitting a proposal for the organization of the prepayment plan so that it is controlled by the subscribers with due representation of hospitals and physicians. They would devise a scheme of relationships between physicians, hospitals, and prepaying public to define their respective roles, their duties, and their responsibilities. —A.B.

Medical Care—A Fringe Benefit. A. Barnes.* Indust. Med. & Surg. 29:78 (Feb.) 1960. (*310 W. Liberty St., Louisville 2, Ky.)

The economics of medicine has been affected by many things. One of the most subtle and possibly the most basic causes of change has been this country's evolution from a predominantly rural agricultural society to an urban industrial society. Various medical care plans utilizing other than traditional fee-for-service existed prior to 1900. Most of these were management-sponsored arrangements to provide relatively comprehensive medical care in isolated areas where medical personnel and facilities were not available.

About 70 years ago Samuel Gompers set about organizing workers on the basis that everyone was entitled to fair compensation for his toil. He organized labor justly and created a new opportunity for industrial workers to share in the fruits of their production. The oldest management medical care plan dates back to 1868. It is natural that unions would also become interested in medical care plans. The first union health center was established by the International Ladies' Garment Workers in 1913.

Events of World War II helped to stimulate the interest of unions in medical care. The wage and hour freeze made fringe benefits attractive. The ruling of the National Labor Relations Board, supported by the courts, that health and welfare funds were suitable subjects for collective bargaining brought many labor unions and employers into cooperation on medical care plans. The more enlightened management has long recognized the value of a healthy working force. Organized Labor's health goal may be simply stated as the provision of "comprehensive medical care on a prepaid basis at cost within everyone's reach, for every worker and his family." In many cases management has been quite sympathetic.

The United Mine Workers Welfare and Retirement Fund was established in 1947, "pursuant to the Labor-Management Relations Act of that year, as an irrevocable trust to be located in Washington, D. C. In conformity with terms of the trust agreement and with federal statutes governing trusts, the Fund is organized and administered by a board of three trustees as a separate entity, independent of the union and the coal operators." —J.D.W.

Clinical Toxicology

A Biochemical Study of the Urinary Protein of Men Exposed to Metallic Mercury. J. C. Smith* and A. R. Wells. Brit J. Indust. Med. 17:209 (July) 1960.

Three men exposed to metallic mercury vapors over a period of two years were found to have proteinuria. The latter is a finding in chronic mercury poisoning that has been reported infrequently. The proteinuria cleared up in two of the men after they were removed from the exposure. The third man continued to excrete protein; his condition however, was diagnosed eventually as a chronic nephritis. Urine specimens were analyzed for mercury contents, free amino acids, protein concentration, electrophoretic behavior of the protein, protein carborhydrate content, protein-bound hexose, amino acids of the electrophoretic components, ultracentrifuge measurements of freeze-dried proteins, and immunologic studies using rabbit antiserum prepared

against proteins of whole normal human serum. The proteins were completely coagulated by heat. A preponderance of globulin was demonstrated by the electrophoretic pattern in the first two men. Five components were demonstrated by the latter method. The protein-bound carbohydrate included galactose, glucose, mannose, fucose, and ribose, and the values were similar to those obtained from urine in cases of nephritis. Urinary free amino acids were within the range of normal. The amino acid composition of the electrophoretic components, presented in tabular form, was found to be indistinguishable from that of protein of corresponding electrophoretic mobility found in urine from patients with chronic nephritis. Similarities, likewise, were noted in the immunological findings. The molecular weight was found to be very near that of serum albumin.

The mechanism by which the protein traversed the kidney is not known. —L.H.M.

The Content of Pyruvic Acid in Tissue Homogenates from Rats Intoxicated with Carbon Tetrachloride. Mongelli-Sciannameo N.* Folia med. 18:531 (June) 1960. (*Istituto di clinica medica generale e terapia medica, University of Ferrara, Italy)

The level of pyruvic acid in tissue homogenates of rats given carbon tetrachloride subcutaneously (0.2 ml) was determined by the Friedmann and Haugen colorimetric method.

The liver content of pyruvic acid rises rapidly after the injection and then decreases in the course of the following two to three weeks, reaching the basal level prior to the injection in the fourth week after the injection.

The concentrations in kidneys, lung, and spleen similarly increase, and they return to the original level within four weeks, with kidneys and lung decreasing their concentration at a slower rate than the other organs. Among the organs analyzed, the brain also had a substantial increase, although much less pronounced than that of the liver, kidney, lung, and spleen.

It is confirmed, therefore, that carbon tetrachloride has a toxic action which is widespread to many organs and which involves those metabolic pathways leading to an increased level of pyruvic acid in tissue. These results are in good agreement with the clinical features associated with intoxication by this substance in that the kidney and liver are affected most, but apparently other organs as well are involved and damaged. —M.C.B.

The Importance of Oxygen in the Treatment of Cyanide Poisoning. C. Cope.* J. A. M. A. 175: 1061 (March 25) 1961. (*Medical Service, Veterans Administration (Kennedy) Hospital, Memphis, Tenn.)

Unfortunately, the use of oxygen in the treatment of cyanide poisoning has not been emphasized in most discussions on this subject in the past. Emphasis has usually been directed to the removal of the patient from the contaminated area, gastric lavage, the inhalation of amyl nitrite, parenteral administration of sodium nitrite nd sodium thiosulfate, and artificial respiration.

That oxygen is beneficial in cyanide intoxication is supported by changes that occurred in the electrocardiogram of a dog that was poisoned by sodium cyanide administered intravenously. After the inhalation of pure oxygen, normal conduction was resumed, gradual regression of the ST changes occurred, and the amplitude of the QRS complexes increased. When the oxygen therapy was interrupted by allowing the animal to breathe regular air, the electrocardiographic changes recurred. In other studies, premature ventricular contractions disappeared after oxygen therapy was instituted.

The therapeutic procedures in poisonings due to inhalation of hydrogen cyanide and to the ingestion of cyanide are reviewed briefly. They consist of (1) elimination of excess cyanide by removal of the patient from the HCN environment, washing of contaminated skin, and, in the case of ingestion, gastric lavage with $NaHCO_3$; (2) maintenance of a high oxygen tension by the administration of 100% oxygen, artificial respiration, and maintenance of normal blood pressure; (3) inhalation and parenteral use of nitrites and intravenous administration of sodium thisoulfate. —L.H.M.

Noise and Hearing

Some Factors Affecting the Spondee Threshold in Normal-Hearing Subjects. T. W. Tillman* and J. F. Jerger. J. Speech & Hearing Res. 2:141 (June) 1959. (*Research Assistant, Northwestern University, Evanston, Ill.)

The purpose of this experiment was to determine the effects on the spondee threshold in normal-hearing subjects of (a) knowledge of spondee test vocabulary and (b) practice in the task of responding to spondee words at threshold intensities. Two spondee thresholds were obtained for each of 30 subjects using the recorded list E of CID Auditory Test W-1. The authors conclude from the result that (a) short-term practice in responding to spondees at threshold intensities exert no important influence on the spondee threshold sound-pressure level (SPL) in normal-hearing subjects and (b) that when subjects are given prior knowledge of the test vocabulary the spondee threshold SPL's are 4 to 5 db lower than those yielded by subjects not given such knowledge. —R.G.H.

Effect of Middle Ear Muscle Action on Certain Psycho-Physical Measurements. S. N. Reger.* Ann. Otol. Rhin. & Laryng. 69:1179 (Dec.) 1960. (*State University of Iowa, Iowa City, Iowa.)

When the intensity of a broad-band masking

noise reaches 100 db sound-pressure level (SPL) or so, the loudness of a low-frequency pure tone that is mixed with the noise does not grow, as one raises its intensity, at the expected rate. Ordinarily, as the intensity of the tone is raised, holding the level of the masking noise constant, the loudness of this tone becomes nearly the same as the loudness of the same tone without the noise; however, under the conditions just stated, a 125-cps tone heard with the noise may have to be raised 10 to 15 db higher than the tone heard alone in order to produce equal-judged loudness, even at high intensities of tone. It is concluded that this represents the attenuation resulting from the acoustic reflex aroused by the noise. Some data are also presented describing the change in threshold that can be produced by some persons who have the ability to contract the middle ear muscles at will. —W.D.W.

The Effect of Ear Protectors Against Sound Waves From Explosions. G. Flottorp* and S. Quist-Hanssen. Acta oto-laryng. Suppl. 158:286 1960. (*Rikshospitalet, Oslo, Norway.)

In an attempt to measure the attenuation of acoustic pulses afforded by various ear protectors, a dummy head of solid oak with holes for the simulated ear canal and a condenser microphone was contructed. The reduction in intensity of both pure tones and two types of simulated gunfire (using third-octave analysis and a mechanical recorder rather than oscillographic records) was measured in the artificial ear canal when the opening was occluded with glass down, an MSA-type earplug, and an ear muff, respectively. For frequencies above 250 cps, the results show that the attenuation of the acoustic pulses can be predicted directly from the spectrum of the pulse and a knowledge of the pure-tone attenuation characteristics of the protective device. Below 250 cps, instead of the near-zero attenuation usually found for pure tones, the present results indicate as much as 50 db of protection from these low-frequency components of the pulses. Glass down apparently is just as effective a protector as the MSA-type earplugs against impulse noise. —W.D.W.

The Intra-Aural Muscle Reflexes in Normal Persons and in Workers Exposed to Intense Industrial Noise. K. Terkildsen.* Acta oto-laryng. 52:384 (Nov.-Dec.) 1960. (*Rigshospitalet, Blegdamsvej 9, Copenhagen, Denmark.)

The latency and strength of contraction of the muscles of the middle ear, an action that provides attenuation of steady sounds, were investigated in 50 normal observers and in 18 factory workers who had been employed for an average of 11 years in "intense noise" and who showed an average loss at 4 kc of 40 db. The action of the reflex was inferred from changes in the effective impedance of one ear correlated with stimulation by a 1000-cps tone in the opposite ear, a measure that is shown to depend on the action of the tensor tympani more than on the stapedius. There were no differences between the groups in either threshold or latency of the indicated reflex. There were also no differences between male and female normals. Unexpectedly, the strength of contraction of the tensor tympani apparently was significantly less in the factory workers than in the normals. The author concludes that this indicates that "in normal persons the contraction elicited in this muscle sometimes may be even unnecessarily strong, and that under the influence of continuous intense noise it can adapt itself to a lower level of function." —W.D.W.

Industrial Hygiene Controls

Threshold Limit Values for 1960. Committee on Threshold Values, American Conference of Government Industrial Hygienists.* Arch. Environmental Health 1:63 (Aug.) 1960. (*Allan L. Coleman, Chairman of Committee, 345 Main Street, Hartford, Conn.)

The Committee on Threshold Limits of the American Conference of Governmental Hygienists reevaluates its published threshold limits on an annual basis. Present values were adopted by the 22nd annual meeting of this conference. The committee places emphasis on the concept that the threshold values should be used as guides in the control of health hazards. They should not be regarded as fine lines between safe and dangerous concentrations.

Listed values are time-weighted and are applicable for exposures encountered in a normal workday. For this reason, these values are not useful guides in evaluating community air pollution problems. —L.W.S.

Evaluation of an Aerosol Photometer for Dust Counting and Sizing. A. D. Hosley,* H. H. Jones, and H. E. Ayer. Am. Indust. Hyg. A. J. 21:491 (Dec.) 1960. (*Occupational Health Research and Training Facility, U.S. Public Health Service, 1014 Broadway, Cincinnati 2, Ohio.)

As the authors point out, dust counting and sizing by the light field technique with an ordinary microscope is a slow and difficult measurement which almost everyone feels can and should be improved. With the advent of automation and miniaturized circuits for electronic equipment, it now appears that the dream of every industrial hygienist, who has been charged with the dust counting and sizing responsibilities, may be realized.

"This report describes an aerosol photometer developed by the Southern Research Institute (SRI) and gives preliminary results of comparative tests made with it and the midget impinger, using the standard light field counting technique." The basic principles of the instrument are described along with a series of laboratory tests

which were used in comparing the instrument measurements with the results from conventional dust-counting techniques. Laboratory tests were carried out on six types of air-borne dust, namely, natural diatomaceous earth, flux-calcined diatomaceous earth, Portland cement, silica flour, coal and sintered iron. Since the light field technique permits counting and measuring particles down to a minimum particle size, it is necessary to adjust the aerosol photometer to compensate for this low point by actual caliberation for each particular type of dust.

Based on the laboratory tests which were carried out, the authors concluded that "results of preliminary laboratory tests on six types of dust indicate that this aerosol photometer with proper adjustment can be used with the same degree of accuracy as the impinger technique. Furthermore, particle size distribution curves prepared from data using the aerosol photometer and the membrane filter method, while not always parallel, are in good agreement at the median size and check quite closely for about 70% of the particles, i.e., from about 15% to 85%" on the cumulative frequency distribution curve.

"No extensive field tests have been made using this instrument. It has been useful in studies conducted in a nuclear submarine, in so-called 'clean rooms' at a large aircraft plant, in a steel mill, and at a plant involving bagasse dust.

"The aerosol photometer is not commercially available but one manufacturer is considering production and may have a prototype available within the next two years." —E.C.R.

Internal Medicine

Pheochromocytoma. C. H. Hardie and R. L. Suechting.* J.A.M.A. 174:1533 (Nov. 12) 1960. (*116 S. Commercial St., Neenah, Wis.)

Pheochromocytoma is still considered a rare disease; however, it has been estimated that about 800 persons die annually with it or of it. The symptoms are usually paroxysmal. The typical symptoms are severe pounding headache, generalized weakness, tremor, sweating, and nausea; less typical symptoms that may be of significance in the diagnosis are increased auditory sensitivity and prickling sensations in the hands and arms.

In the case presented, the patient's hand was immersed in ice water, a tourniquet applied, and 0.025 mg of histamine injected intravenously; this resulted in an attack of hypertension which was quickly reversed by phentolamine (Regitine) hydrochloride. The patient's blood pressure was normal at the time of the test; otherwise, phentolamine hydrochloride would have been used. Deep palpation in the right flank area precipitated an acute episode. The basal metabolic rate is often increased in pheochromocytoma, as is the fasting blood sugar.

Many conditions resemble pheochromocytoma, most commonly anxiety or hysteria often accompanied by hyperventilation. Other diagnoses should be considered, such as vascular headaches, menopausal tension, angioneurotic edema, chronic nervous fatigue, epilepsy, and space-occupying lesions.

It is well documented that these tumors can arise from places other than the adrenal glands; the site may be anywhere in the abdomen or even the chest. —S.H.S.

Avascular (Aseptic) Bone Necrosis Associated with Systemic Lupus Erythematosus. E. L. Dubois* and L. Cozen. J.A.M.A. 174:966 (Oct. 22) 1960. (*Box 138, 1200 N. State St., Los Angeles, Calif.)

Bilateral avascular necrosis may occur in Gaucher's disease, sickle cell anemia, and neoplasms. This is a report of 11 patients having avascular necrosis, primarily involving both femoral heads, associated with rheumatoid arthritis or systemic lupus erythematosus.

A characteristic pain pattern, persistent localized pain on motion to one joint, is suspect of aseptic necrosis rather than arthralgia associated with the underlying disease. X-ray films at the time of the onset of pain usually show early changes due to avascular necrosis, namely, increased density of the diseased bone. The articular surfaces are not involved in the early stages. Later subchondral necrosis occurs, and still later there is loss of the entire femoral head or marked degeneration of the femoral condyles.

In the cases studied, there was no relationship between corticosteroid therapy and the onset of symptoms.

The authors conclude that the finding of avascular necrosis of the femoral heads or femoral condyles warrants further investigation as systemic lupus erythematosus may be the underlying etiologic factor. —S.H.S.

The Role of Effort and Occupation (Including Physicians) in Coronary Occlusion. A. M. Master.* J.A.M.A. 174:942 (Oct. 22) 1960. (*125 E. 72nd St., New York, N. Y.)

Master and his co-workers investigated 2,600 cases of confirmed coronary occlusion. Two basic coronary episodes are differentiated: acute coronary insufficiency without occlusion and acute coronary occlusion.

Effort, emotional stress, straining at stool, sexual intercourse, paroxysmal tachycardia, shock, and hemorrhage all precipitate coronary insufficiency without occlusion, the mechanisms being increased heart work, decreased coronary flow, and diminished oxygen-carrying capacity of the blood. These factors are not operative in causing acute coronary occlusion.

The author's investigations for this report deal only with coronary occlusion with through-and-through myocardial infarction. The author concludes that neither occupation, nor effort, nor

rest is responsible for this type of heart attack. Neither the cause nor the prevention of acute coronary occlusion is known. Master indicates it is the end-result of atherosclerosis and that it occurs independently of external influences.

—S.H.S.

Treatment of Multiple Sclerosis with Tolbutamide: Preliminary Report. G. T. Sawyer.* J.A.M.A. 174: 470 (Oct. 1) 1960. (*2115 East River Terrace, Minneapolis, Minn.)

Several writers have postulated that multiple sclerosis may be due to a disorder of carbohydrate metabolism. The present study is a preliminary one and is to be followed by a double-blind evaluation on a larger group of patients. The present report deals with the use of tolbutamide in seven patients with multiple sclerosis. The intake of dietary carbohydrate was also varied.

Sawyer recognizes the difficulties in the evaluation of any treatment in multiple sclerosis. His cases were evaluated clinically only, but the changes were striking and probably significant. Definite improvement in the signs and symptoms occurred in all seven patients when taking tolbutamide except when used with a high-carbohydrate diet. Deterioration occurred when placebos were used. In nearly all of the patients a low-carbohydrate diet was beneficial, while a high one caused unfavorable results. The dosage of tolbutamide was from 0.5 to 1.5 gm per day. —S.H.S.

Radiation Health

Some Biomedical Problems of the Nuclear Age. C. L. Dunham.* Radiology 75:815 (Nov.) 1960. (*Division of Biology and Medicine, U.S. Atomic Energy Commission, Washington 25, D. C.)

Review of current status and trends in research on radiobiology shows a primary interest in establishing the relationships between dose, dose rate, and biological effect. Although there is a greater body of knowledge on radiation effects than on any other industrial or general environmental toxic hazard, there are still many unsolved problems, such as establishing the presence of a threshold dose below which life shortening, leukemia, or tumor inductions will not occur. Whereas previously the presence of such a threshold dose was tacitly assumed, present opinion places the burden of proof on its proponents. The proportionality of dose and leukemia induction has been demonstrated to 100 r or below, while a linear genetic response in Drosophila has been seen from 13,000 r to 25 r. Another research category of current interest is the study of concentrations of radioisotopes, such as radium-226 and strontium-90, in the air and food to the eventual body and organ concentrations. Research to develop effective prophylaxis and treatment of whole-body radiation injury by use of AET and related compounds and homologous bone marrow infusions has had limited success in humans. —G.L.V.

Delayed Radiation Effects in Survivors of the Atomic Bombings. J. W. Hollingsworth.* New England J. Med. 263:481 (Sept. 8) 1960. (*Atomic Bomb Casualty Commission, Hiroshima and Nagasaki, Japan).

About 60,000 persons within 2,000 meters of the bomb hypocenters in Hiroshima and Nagasaki survived the 1945 attack and were still living in the cities in 1950. Of these, 7,000 persons experienced the acute radiation syndrome, including epilation, purpura, and oropharyngeal ulcerations. They provide an outstanding opportunity to study the delayed effects of irradiation in man.

The only positive finding of genetic damage has been a statistically significant change in male-female ratios due to sex-linked lethal mutations. There were no demonstrable increases in major congenital abnormalities, stillbirths, or infant mortality. The risk of genetic damage for the individual survivor is very small. An increased incidence of leukemia, especially chronic granulocytic leukemia, reached a peak in 1950-1952. The incidence of leukemia induction supports a linear relation to radiation doses above perhaps 75 r. The leukemia incidence in survivors under 1,000 meters may be increased 10 to 50 times.

The incidence of other malignant conditions in the high-exposure groups was about twice as high as in the control population. Cataracts visible by ophthalmoscope were noted in only 154 survivors, and the loss of visual acuity was small. Child growth and development, microcephaly in children exposed in utero, age acceleration, and general medical effects are discussed. —G.L.V.

Radiation Dosimetry in Hiroshima and Nagasaki Atomic-Bomb Survivors. E. T. Arakawa.* New England J. Med. 263:488 (Sept. 8) 1960. (*Health Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tenn.)

Since 1956 there has been a reevaluation study made of the radiation doses received by Hiroshima and Nagasaki bomb survivors. The radiation dose was delivered by direct radiation from the bombs with an insignificant amount of induced radiation and fallout. The program to reduce the uncertainties in estimating the air dose includes experimental tests conducted in Nevada in 1957 to study radiation scattering and attenuation by structural materials. In addition, direct interrogation of the thousands of persons involved will permit exact identification of their positions with respect to the source of radiation. This will allow more precise estimation of shielding effects on each person. It is hoped that the data will permit the application of a given radiation dose to the late biologic phenomenon observed in the survivors. Important problems remain to be solved, however, before accurate doses can be assigned to individual survivors. The current method of assigning tentative doses is illustrated. —G.L.V.

HOW TO BE PREPARED FOR ACID OR ALKALI BURNS

Clinical Research and User Tests Establish the Effectiveness of NEUTRALIZE

Every year, far too many workers are needlessly injured because someone failed to prepare for accidental acid/alkali burns by keeping a supply of NEUTRALIZE on hand and instructing employees how to use it.

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Water and antidotes may be dangerous

Water may be ineffective for several reasons. There must be an ample supply available immediately and the irrigation must continue for 15 to 30 minutes. Even then, extensive tests prove that water dilutes chemicals slowly, and has less effect on the layer of chemicals next to the membrane and will not remove those that have penetrated the tissue surface.

If an improper antidote is applied, the danger may be compounded. Under pressure to *do* something to relieve suffering, who knows exactly what *is* proper—particularly when the victim may not be able to identify the material that splashed.

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About the Authors

► BENJAMIN B. WEYBREW, Ph.D., is author of the second article in the symposium on Human Factors and the Work Environment presented before the New York State Society of Industrial Medicine, Inc., the IMA Component Society with headquarters in New York City. Dr. Weybrew's contribution is based in part upon his own research made aboard the nuclear-powered submarine *Triton* during the recent underwater circumnavigation of the world.

A native of Kansas, Dr. Weybrew received the B.A. degree from the University of Kansas in 1947. He had served in the U.S. Navy from 1942 to 1946, between high school and college, in the Southwest Pacific Theatre. He received the M.A. degree from the University of California at Los Angeles in 1950. He became a research psychologist at the U.S. Naval Submarine Base, New London, Conn., and interrupted this service to take a Ph.D. degree at the University of Colorado in 1955. After this he was appointed Head, Personnel Assessment Branch, U.S. Naval Medical Research Laboratory, at the New London Base. He has published extensively in the open literature and in limited circulation Navy reports on matters that have a bearing on the subject of his present article.

► WILLIAM B. HARRIS is an environmental health consultant, Pleasantville, N.Y. He is well known around the circuit of AEC installations which he visits for purposes of inquiring into environmental radiation problems.

Mr. Harris holds a bachelor's degree in chemical engineering from Rensselaer (N.Y.) Polytechnic Institute, and an M.S. degree in industrial hygiene from the Graduate School of Engineering, Harvard University. From 1937-1948 he was an industrial hygiene engineer in the Division of Industrial Hygiene, New York State Department of Labor. After war service as an industrial hygiene and safety officer he became Director, Environmental Sciences Division, Health and Safety Laboratory, the New York Operations Office of the Atomic Energy Commission. He was responsible for control of the radiation and chemical hazards that originate within AEC installations and problems in the surrounding community as well as within the plant concerned. He held this position until early this year.

Mr. Harris has 25 publications in the open literature and in unclassified AEC documents, dealing with control of environmental contaminants. He serves on a long list of technical committees that deal with problems in his special field. He is the senior author of the article in this issue, "Operational, Emotional, and Legal Problems in the Application of Maximum Permissible Radiation Dose."

HANSON BLATZ, who is Mr. Harris' co-author, is most widely known in connection with the cyclopedic Radiation-Hygiene Handbook (New York, N.Y., McGraw-Hill Book Co., Inc.), of which he is editor-in-chief.

Mr. Blatz holds a degree in electrical engineering from the Polytechnic Institute of Brooklyn (N.Y.), received in 1929. In the intervening years he has completed graduate studies at Columbia University, New York, N.Y.; and at the University of Rochester (N.Y.). He is now Director, Office of Radiation Control, New York City Department of Health; and he is on the part-time faculty of New York University Post-Graduate Medical School, where he is an associate professor of industrial medicine.

► ROBERT K. GAD, JR., is author of the article in this issue, "The Office Environment—Fact or Fancy," in which Fact is shown to fare rather poorly in the face of the pressures of Fancy. This engaging piece stems from years of practical experience as a planning consultant with the Shaw-Walker Company, where Mr. Gad is now Director of the Office Planning Division.

Mr. Gad's career began in the U.S. Army Amphibious Engineer Command (Rangers) early in 1942. Two years later he was assigned to the Air Corps to assist in the activation of the First Air-Sea Rescue Squadron. He was retired from military service in 1945 as a major.

Mr. Gad joined Shaw-Walker in 1946 as a member of the firm's new professional planning service, and became Director of the Division in the following year. Because of the extensive list of clients served over the next several years—and the list includes most of the "blue chips" of American business—it fortunately becomes impossible to identify the particular firm or firms responsible for creating Mr. Gad's present attitude toward his life's work. Perhaps a conclusion of this sort would be an error in any case. The author is probably dealing with a basic quality in human nature rather than a specific situation.

► HEINRICH BRIEGER, M.D., D.P.H., was born in Germany and has been in this country since 1939. He graduated from the medical faculty of the University of Breslau in 1918 and received his diploma in Preventive Medicine and Public Health from the Public Health School, Berlin, in 1925. Dr. Brieger took graduate training in internal medicine and toxicology in Breslau and Munich, and in preventive and industrial medicine at the State Institute of Preventive Medicine in Frankfurt am Main and the Institute of Forensic and Social Medicine, University of Marburg. He joined the German Public Health Service and, in addition, taught occupational medicine at the Public Health School, Breslau.

Until 1945, Dr. Brieger was Associate Professor of Industrial Hygiene at Hahenmann Medical College, Philadelphia, Pa. Since then, he has been associated with The Jefferson Medical College of Philadelphia, where he holds the position of Professor of Industrial Medicine and Director of the Division of Industrial Medicine. He is also Visiting Lecturer in Occupational Medicine at the Graduate School of Medicine of the University of Pennsylvania, Philadelphia.

Most of his contributions to books and his scientific papers deal with physiology of work and with industrial toxicology. —EDITOR

Sounding Board

News of Interest in the Field of Noise Control

Your Hearing Conservation Program Begins With an Accurate Analysis of Noise-Exposure

Because prolonged exposure to harmful noises cause early-induced hearing loss which is not easily discernible, the accurate analysis of these noises is a vital part of a proper Hearing Conservation Program.

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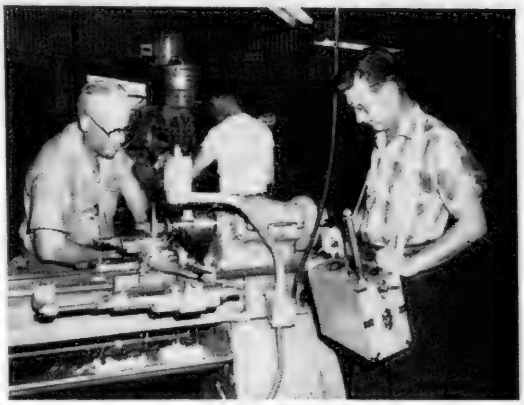
The Rudmose R.A. #100 Sound Analyzer is an addition to the equipment distributed by Industrial Acoustics Company, Inc., for instituting a complete and effective Hearing Conservation Program. The Rudmose Automatic Audiometer is available for rapid and accurate hearing tests; and IAC Audiometric Examination Rooms for providing a proper environment for obtaining accurate audiograms. Circle 66.

Control of Noise a Factor

Another important part of any Hearing Conservation Program is the control of noise at its source. This is accomplished by the use of IAC complete or partial noisy machinery enclosures or by protecting personnel with IAC "Quiet Rooms" to shield workers from damaging noise. Circle 67.



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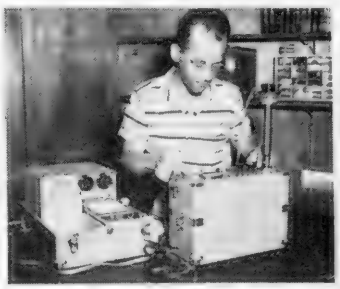

R.A. #100 Sound Analyzer being used to check audiometer. The earphone coupler transmits audiometer signals into microphone for checking.

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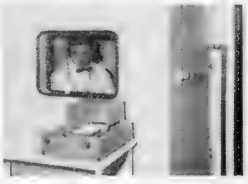

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Weiner, A. L., and Fixler, Z. C.: J.A.M.A. 169:346, 1959.

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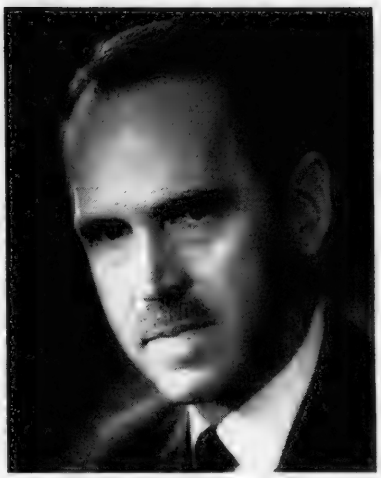
People and Events

► GORDON A. SINCLAIR, M.D., has been appointed Medical Director of Imperial Oil Limited, Toronto, Ont., succeeding RUSSELL G. BIRRELL, M.D., who has retired after 14 years as the company's Medical Director. DR. SINCLAIR had been Assistant Medical Director since 1950. J. L. A. FOWLER, M.D., has been appointed to fill this position.

DR. SINCLAIR joined Imperial in 1947 as physician-in-charge in Toronto. He is a specialist in internal medicine and in occupational medicine. He received his M.D. degree from the University of Toronto in 1926 and entered private practice. He did postgraduate work in internal medicine in London. During the Second World War he served overseas with the R.C.A.M.C. and attained the rank of brigadier. He is a Director of the Industrial Medical Association, a Fellow of the American Academy of Occupational Medicine, a Diplomate of the American Board of Preventive Medicine, certified in Occupational Medicine, and a certified specialist in Internal Medicine, Royal College of Physicians and Surgeons (Canada).



Gordon A. Sinclair, M.D.

DR. FOWLER, who has been associated with Imperial on a part-time basis since 1947, joined the regular staff in 1951. Previous to his present position he was regional physician, Toronto. After graduating from the University of Toronto with the M.D. degree in 1937, he took postgraduate training and obtained specialist certification in internal medicine. In the Second World War he served overseas with the R.C.A.M.C. and retired with the rank of major. He is a past-president of the Medical Alumni Association of the University of Toronto.

DR. BIRRELL retires after a distinguished career which took him to China, Peru and the United States. He graduated from the University of Toronto Medical College in 1921. From 1921 to 1925 he taught and did research work at the Peking Union Medical College. He began his career in industrial medicine with International Petroleum Company in Talara, Peru, in 1928. He joined the Medical Department of Standard Oil Company (N.J.) in 1929, where he remained

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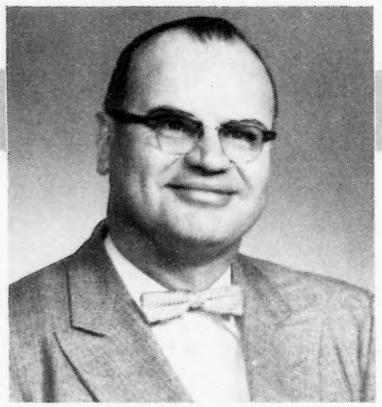

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until joining Imperial in 1947. Under his direction, Imperial Oil received the Health Achievement in Industry Award of the Industrial Medical Association in 1953.

DR. BIRRELL is a member of the editorial board of the JOURNAL OF OCCUPATIONAL MEDICINE. He is a Fellow of the Industrial Medical Association and served as a Director from 1950 to 1954. He is a Diplomate of the American Board of Preventive Medicine, certified in Occupational Medicine.

► JAMES L. HUGHES, M.D., has been appointed Director of Industrial Medicine for the Grace Finishing Plant and the Kershaw Plant of The Springs Cotton Mills, Lancaster, S.C.

DR. HUGHES received his M.D. degree from Emory University School of Medicine in 1935. He has been in private practice for 25 years, including 17 years in part-time work in industrial medicine. Since 1955 DR. HUGHES has been Medical Director on a part-time basis for the Wamsutta Mill of the Lyman Printing and Finishing Co. He is a charter member and past-president of the South Carolina Industrial Medical Association; a member of the Southern Medical Association and chairman-elect of this organization's Section on Industrial Medicine; and a member-at-large of the executive committee of the Carolina Industrial Medical Association.

► RUTH G. WHITFIELD, R.N., Supervisor, Nursing Services, Texaco, Inc., New York City, has been elected President of the American Association of Industrial Nurses. She has previously served the AAIN as First Vice-President, Second Vice-President, as a member of the Board of Directors and with numerous committees.

MISS WHITFIELD is a graduate of Presbyterian Hospital in New York and Columbia University Teachers College. She has been employed as an industrial nurse by Texaco since 1946. She is a past-president of the New York State Association of Industrial Nurses and of the Greater New York Association of Industrial Nurses.

Other officers elected by the AAIN at its 19th annual meeting in Los Angeles, April 11-13,

Ruth G. Whitfield, R.N.

are: Second Vice-President—EDNA WATSON, R.N., Guide Lamp Division, General Motors Corporation, Anderson, Ind.; and Financial Secretary—JOYCE N. BENOIT, R.N., The New York Times Co., New York City. Named to the organization's Board of Directors were: MARY G. DEEGAN, R.N., Pennsylvania Department of Health, Pittsburgh, Pa.; PAULINE A. MELTON, R.N., Mobil Oil Company, Dallas, Tex.; RUTH M. PATTERSON, R.N., Boeing Airplane Company, Wichita, Kan.; CONSTANCE POWERS, R.N., Continental Can Company, Inc., Tampa, Fla.; EDITH J. RUSSELL, R.N., Rochester Gas and Electric Corporation, Rochester, N.Y.; and ELEANOR V. WILLIAMS, R.N., Connecticut Bank and Trust Company, Hartford, Conn.

► New York State Society of Industrial Medicine, Inc., will hold a luncheon meeting during the week of the American Medical Association's Annual Meeting in New York City. Members of the Industrial Medical Association are invited to attend the luncheon which is scheduled on Thursday, June 29, at the New York University Club. Speaker will be JAMES H. STERNER, M.D., whose address is entitled "A Renaissance for Small Plant Occupational Health Programs." Reservations should be made with LEON WARSHAW, M.D., Medical Director, Paramount Pictures Corp., 1501 Broadway, New York 36, N.Y.

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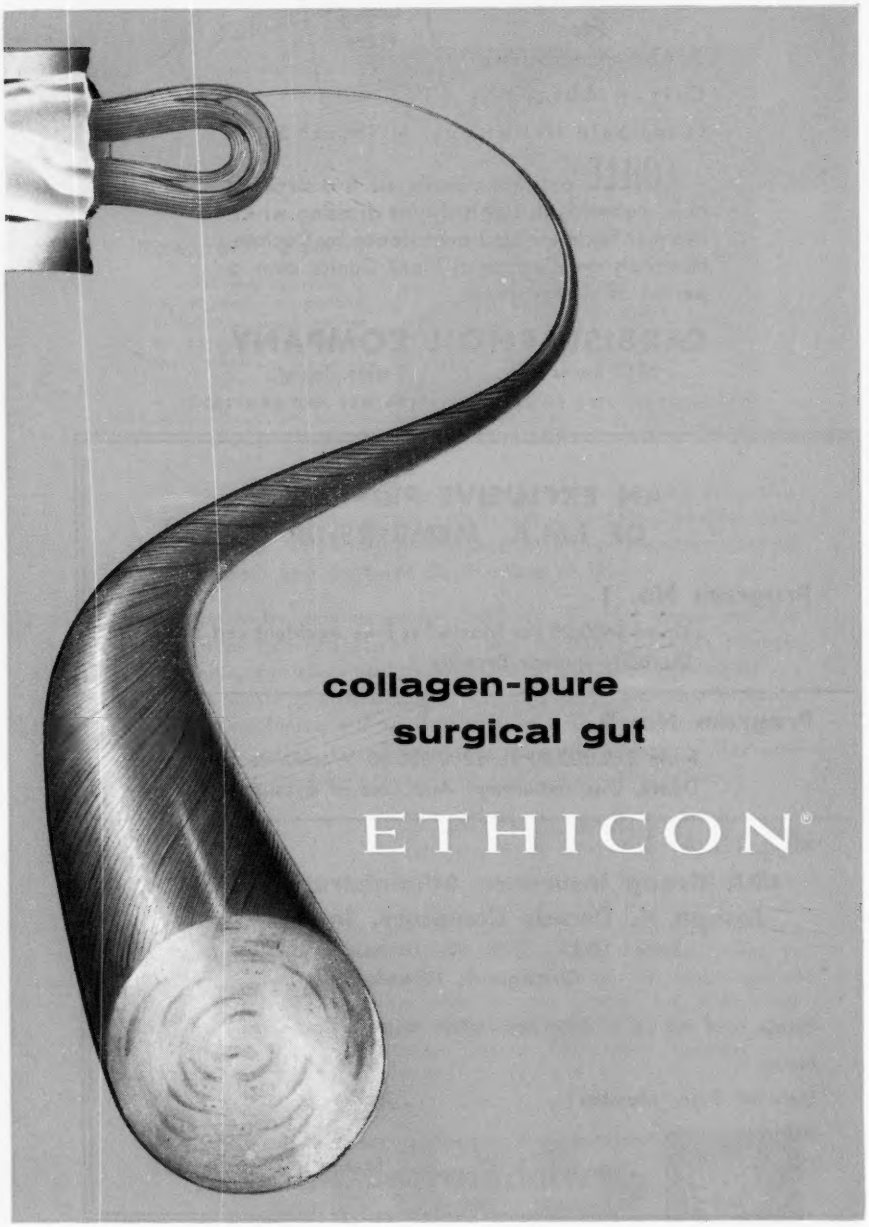
People and Events

Upstate New York will hold its annual spring meeting June 2-4 at Whiteface Inn, Lake Placid, N.Y. Featured on the scientific portion of the program is an address entitled "The Hand" which is to be presented by HERBERT M. BERGAMINI, M.D., consultant in surgery, Lake Placid. The group will also visit the Trudeau Foundation Laboratories at Saranac Lake, N.Y. Various social functions and activities round out the schedule of events.

► Third Columbian Occupational Health Seminar will be held in Cali, Colombia, South America, from June 19 to 24. Many occupational health officials from other countries are expected to attend the Seminar, which is sponsored by the Occupational Health Division of the Colombia Ministry of Labor. FRANK PRINCI, M.D., Medical Director, Ethyl Corporation, and Associate Director of the University of Cincinnati's Kettering Laboratory, has been invited to serve as a leader of one of the fields of discussion. Leaders of the other two fields of discussion will be DR. JACY MONTENEGRO MAGALHAES, President of the Pan-American Union of Industrial Medicine, and CESAR MACHER, Institute of Occupational Health of Peru.

► Central States Society of Industrial Medicine and Surgery held its annual meeting on May 21 in Chicago, Ill. Two papers were presented at the scientific session. They were "The Use of Physiotherapy in Plants, Both Large and Small" by BERNARD J. MICHELA, M.D., Director, The Rehabilitation Institute of Chicago; and "New Toxic Materials for Industry" by WARREN A. COOK, Professor of Industrial Health, Department of Industrial Hygiene, University of Michigan, Ann Arbor, Mich.

► Texas Industrial Medical Association held its annual meeting April 23 at the Buccaneer Hotel in Galveston. At the business meeting the following officers were elected: President—ROBERT A. WISE, M.D.; President-Elect—J. GORDON BURDICK, M.D.; Vice-President—F. W. WILSON, M.D.; Secretary-Treasurer—ROY E. JOYNER, M.D.; Directors—E. E. BADEN, M.D.; VALLIANT C. BAIRD, M.D., and FRED FINK, M.D.



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